

COMMUNITY COLLEGE FACULTY USE OF EDUCATIONAL DATA

by
Denice Inciong

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Abstract

Data use for teachers' educational decision-making and improved practices have been studied in K-12 contexts, but not much is known about faculty data use in post-secondary education. Data use, and its relationship to teaching and learning are complex phenomena. This study examined community college faculty's perceptions of data use in their community college context and their experiences in a collaborative data use professional development workshop series. The learning experience was intended to support using data coaches along with peer learning to improve faculty participants' ability to access and use data for their teaching practice, as well as support their data use efficacy. A mixed-methods study was conducted to explore how faculty participants experience an online data use program and its effects on their data use constructs. The 18 participants were from two community colleges on the West Coast. The Faculty Data Use Survey data, focus group interviews, and observation notes from the data coaches were used to understand participants' data access and support, their attitude and efficacy in using data, and the effects of a collaborative experience. Although statistically significant differences were not found, participants maintained a positive attitude and a high level of efficacy in using data. Qualitative data provided insights into providing better access and support and suggested that collaboration around data supports faculty's learning to use data more effectively for their practice.

Keywords: community college, faculty, data use, collaborative learning

Co-Advisors: Lauren Germain & Robert N. Ronau

Dedication

This thesis is dedicated to my parents, Lynne and Tom Sugiyama, who always believed in education and that I could complete a doctorate.

Acknowledgments

One aspect I value in higher education is the shared decision-making process and how much I learn when listening to other perspectives. My dissertation journey began with the desire to improve institutional research services for faculty in my district. I am immensely thankful to the 18 faculty members who gave their time, energy, and valuable insights to this research and continually taught me new things along the way.

I could not have done this study without my RPDM team, my fantastic data coaches, who were always there for me and provided their expertise in the data workshops and analyses. They are a talented group of individuals that I am so grateful to work with every day.

I would like to express my sincerest, heartfelt gratitude to my co-advisors, Dr. Lauren Germain and Dr. Robert Ronau, for their teaching, support, encouragement, insightful feedback, and belief in my research study. I constantly felt so lucky to have them as advisors and teachers! To Dr. Carey Borkoski, I was fortunate and grateful you could be on my committee and part of the CaliGirls; you were our exemplar throughout the program. To my executive sponsor and mentor, Dr. Robert Bramucci, thank you for years of support and belief in me and so many life lessons. To my friend, Morgan Barrows, for being my biggest cheerleader and for the weekly support session lunches. To my forever friends, the CaliGirls, Patricia Szasz, Kyla Wegman, and Elaine Young, for all the text messages, group work, exam prep sessions, and 3:45 a.m. wake-up calls to register for classes. I could not have gotten through this program without the brilliance and friendship of the three of you.

Finally, my deepest thanks and gratitude is reserved for my husband, Barry, and our fur baby, Bernie. You both were the most supportive!

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Executive Summary

Institutional Research (IR) offices' functions are part of a newer strand of accountability referred to as *institutional effectiveness*. Brown (2018) explained that the concept of institutional effectiveness combines three areas of accountability: (a) required reporting mandates (e.g., accreditation), (b) learning assessments (e.g., student learning outcomes), and (c) organizational effectiveness (e.g., strategic plans, goals, and key performance indicators). Swing and Ross (2016) proposed a paradigm of institutional effectiveness and viewed IR offices as evolving from mainly responding to accountability requirements to working with stakeholders across the organization. The researchers offered a realignment for IR office members to assume roles beyond keeping and reporting data for upper management, instead of focusing on providing educational data to support and empower all stakeholders as change agents for the institution (Swing & Ross, 2016).

Using educational data to inform institutional performance and productivity has been a longstanding trend in policy research and is a critical component of educational reform. Faculty are active drivers of initiative in the community college and essential in the shared governance process (Kerrigan, 2014). There is a large body of research on teachers' data use in the K-12 contexts (Mandinach & Jimerson, 2016; Mandinach & Schildkamp, 2020). However, there is little empirical research on faculty use of data to inform instructional practice, and "little is known about how postsecondary faculty think about and use data when making decisions about their teaching" (Hora, Bouwma-Gearhart, & Park, 2014, pp. 1–2).

Problem of Practice

My problem of practice (POP) addressed faculties' IR data use at a community college district on the West Coast. The use of educational data to inform a teacher's practice and

improve student learning is complex (Mandinach & Jimerson, 2016; Spillane, 2012). Research over the last decade in the K-12 environment has shown a fuller understanding of teachers' data use (Jimerson, 2016; Jimerson & McGhee, 2013; Mandinach & Jimerson, 2016). Limited empirical research has shown what specific data postsecondary faculty use in their jobs and the extent to which they use data for educational questions and their teaching (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). Recent researchers have explored how faculty use data to inform their practice, yet researchers have found there is much to learn (Hora et al., 2017; Hora & Smolarek, 2018; Kerrigan, 2014). IR office members are well-positioned in higher education institutions to examine faculty use of data to improve organizational outcomes (Swing, Jones, & Ross, 2016; Terenzini, 2013). This POP researcher explored how community college IR office members could leverage existing data use research to support community college faculty's use of data to understand further their use of educational data for their teaching.

Data and Data Use Defined

Researchers studying data use in K-12 settings have focused on organizational decisions and institutional changes on student outcomes (Coburn & Turner, 2011; Datnow & Hubbard, 2016). Data-driven decision-making (DDDM) is often referred to when addressing accountability mandates (Dunn, Airola, Lo, & Garrison, 2013a). The term DDDM is common in the literature. Researchers have shown the factors within this framework, focusing studies on how teachers understand data and data use to determine how to measure the impact of data use on student outcomes (Mandinach & Gummer, 2015). Understanding what teachers mean by the terms data and data use in an educational institution setting has created a foundation researchers can use to examine how teachers make decisions in their instructional practices (Jimerson & McGhee, 2013).

Educational data are used at various levels of the organization. Data used at the macro-level (e.g., state or government agencies) are typically collected systematically and analyzed across a state, district, or school (Ikemoto & Marsh, 2007). Data use for educators within an institution refers to how data about students are collected, organized, and analyzed (Wayman, Jimerson, & Cho, 2012). In another definition, data use refers to a “structured, evidence-informed inquiry process that results in decisions aimed at improving teaching and learning” (Jimerson & Childs, 2017, p. 587). Researchers using this definition focus on data the teacher uses for guiding instruction.

Data can be defined as any raw input of information (e.g., numerical) that the individual processes with knowledge and other information to make a decision (Ikemoto & Marsh, 2007). Researchers have also defined data as “any information that helps educators know more about their students, and that can be codified in some manner” (Jimerson & Wayman, 2015, p. 3). Although similar, researchers have defined data as based on the student at the center of the faculty’s decision. As there is no one definitive definition of data and data use, the researcher of this POP used data and data use based on all the definitions described from the literature reviewed, focusing on data used by teachers and faculty for their instructional practices.

Needs Assessment Findings

The needs assessment research provided an opportunity to explore faculty beliefs and attitudes regarding data use in a community college setting and explored the data constructs of access, attitudes, and anxiety in data use, data efficacy, collaboration, and data culture of faculty. Several key findings in the needs assessment were essential to consider when designing an intervention for faculty in the study context. First, most faculty members noted that using education data was beneficial to their teaching, but they did not access the IR data warehouse.

Many wanted to learn and participate in training on accessing and using the data. Second, faculty members believed that they could use data for teaching, but many did not know how to apply data to their practices and wanted more training. Lastly, themes to explore further included faculty collaboration with data and understanding what kinds of data would make a difference in faculty members' use of data.

Conceptual Framework

A conceptual framework illustrates the community college context for faculty data use and the interactions between the IR office and faculty members (Figure 5).

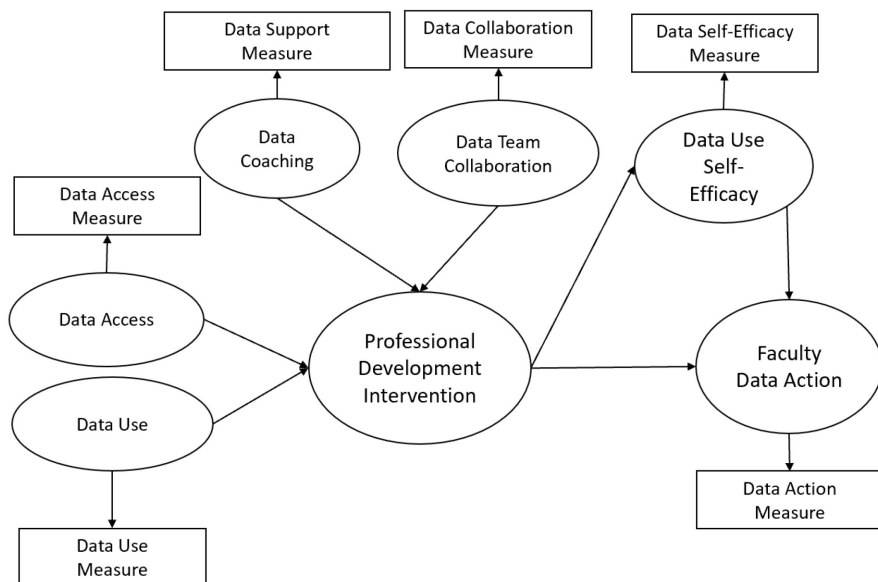


Figure 1. Conceptual framework measurement model for faculty data use intervention.

The factors outlined interacted and potentially impacted the relationship between faculty and the intervention. IR office members sought to understand the complicated interplay of context and underlying factors that influenced faculty members' motivations to use educational data. The literature review shows interventions that one can use to understand factors further in faculty data use to improve the IR office's services.

Intervention Design

In response to the needs assessment, the Faculty Data Use Collaborative (FDUC) intervention was designed for community college faculty to increase faculty access, understanding, and use of educational data for their teaching practices. The intervention leader built on an existing data system available to faculty at the district's two colleges. The intervention design was informed by researchers focused on faculty members' motivations and data use self-efficacy (Farrell & Marsh, 2016a, 2016b; Reeves & Chiang, 2018), abilities to access and use data (Cho & Wayman, 2015; Klein et al., 2019; McCoy & Shih, 2016), and effective data use collaboratives (Bolhuis et al., 2019; Jimerson et al., 2020; Schildkamp, Poortman, Ebbeler, & Pieters, 2019).

The FDUC was grounded in adult learning principles (Knowles et al., 2014), focusing on effective professional development (Darling-Hammond et al., 2017; Guskey, 2014; Rohlwing & Spelman, 2014) on faculty members' data needs in a community college context. In creating a more optimal learning experience, the intervention leader focused on activities to connect data to faculty interests, consider their experiences using educational data, and plan and collaborate with faculty on learning objectives.

Adult learning principles include the importance of planning with the learner to ensure learning is connected to the targeted audience (Knowles et al., 2014). When developing the intervention, faculty members who led faculty development were consulted to explore the kinds of data and topics that interested them. Personalized faculty dashboards, challenges in understanding data, and student majors and pathways were suggested as topics. These topics and data sets were used as part of the intervention curriculum and activities. The learning experience design included interactive activities and sense-making activities (Darling-Hammond et al.,

2017; Guskey, 2014). Both short presentations provided the necessary knowledge on accessing and using educational data in the data warehouse. Time was provided for discussion and exploration of the data.

A collaborative data team with data coaches was incorporated into the intervention design to support faculty (see Bolhuis et al., 2016b; Bolhuis et al., 2019; Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). Data coaches from the IR office were included to support access and understanding of data (see Bolhuis et al., 2016a, 2016b; Marsh et al., 2015). The data coaches would know what data could be accessed to incorporate these data into tools to address educational questions. The intervention was designed so that the data coaches also facilitated discussions with faculty and remained available to meet one-on-one or in smaller groups to support faculty data needs.

Purpose of Study

The purpose of this study was to understand how faculty experienced a data use collaborative and its impact on critical data use conceptual factors identified in the needs assessment and literature review. The FDUC was a newly created workshop series with individual-level data coaching offered by the IR office. The FDUC was provided over two months, including four synchronous online sessions, an optional synchronous session, and individual meetings between the faculty and data coaches. The workshops were designed to fit data topics of interest to faculty, training, and exploration into existing and new data tools. The research questions in this study included the following:

RQ1: What was the level of faculty engagement and satisfaction in the intervention?

RQ2: To what extent did the intervention change faculty's access and support to use data?

RQ3: What is the effect on faculty data use attitude and self-efficacy in using data after participating in this intervention?

RQ4: To what extent did the intervention change faculty's data use collaboration after participation in the intervention?

Implementation of FDUC

The intervention was designed to target two specific aspects of faculty data use. First, teachers need meaningful learning driven by the faculty members' motivations to use data (Knowles et al., 2014). Secondly, one could use a collaborative approach to build faculty members' data efficacy (see Schildkamp, Smit, et al., 2019). The intentional design of the workshop was to create spaces for faculty to dialog with one another and provide someone who could support accessing and understanding the educational data. The intervention aimed to provide an experience where faculty could learn about the reports and data accessible in the data warehouse and explore their own educational data questions in a collaborative and supportive environment.

An additional aspect of the intervention was the preparation of the data coaches by the researcher. The data coaches were staff in the institutional research office. The IR staff worked extensively with educational data and reports in the data warehouse. The four data coaches included two research analysts, one computer programmer, and one database administrator. Although the IR staff understood a lot about educational data in the warehouse, most had not worked with faculty members. The researcher conducted training sessions that focused on the staff's role in presenting and explaining data tools and facilitating discussions in the workshops.

Conclusions

The FDUC was designed to explore conceptual data use factors to improve faculty data use. While the results may not be generalizable to other contexts, important information was collected on how faculty viewed barriers and supports of data use. This information confirmed that using the reports and navigating the data systems was challenging and provided valuable ways for the IR data system to be improved for faculty needs. More training and professional development were emergent themes that would improve faculty access, support, attitude, and efficacy in using data. The study suggested faculty members found value in participating in collaborative learning experiences with other faculty and the IR office data coaches. An IR office could serve as a lever and change agent in bringing faculty across disciplines and campuses to use data for educational improvement at the institution.

Chapter 1: Institutional Research Problem of Practice

Higher education leaders face pressure to address student outcomes by analyzing their institutions' student data (Dejean, Chen, Baber, & Li, 2018). One of the key accountability reforms in the 21st century was the 2006 report from the Commission on the Future of Higher Education established by then-Secretary of Education Margaret Spellings. The Spellings report included the recommendation to create a culture of transparency and accountability (Rice, 2011). The report also showed the critical role of faculty: "Faculty must be at the forefront of defining educational objectives for students and developing a meaningful, evidence-based measure of their progress toward those goals" (Spellings, 2006, p. 23). Higher education administrators face a challenge when serving many stakeholders, focusing on a specific problem for a single stakeholder group that could improve the organization.

The use of educational data to inform institutional performance and productivity has been a longstanding trend in policy research and continues as a key component in educational reform. Faculty are active drivers of initiative in the community college and essential in the shared governance process (Kerrigan, 2014). There is a large body of research on teachers' data use in the K-12 contexts (Mandinach & Jimerson, 2016; Mandinach & Schildkamp, 2020). However, there is little empirical research on faculty use of data to inform instructional practice, and "little is known about how postsecondary faculty think about and use data when making decisions about their teaching" (Hora, Bouwma-Gearhart, & Park, 2014, pp. 1–2).

In this dissertation, *teachers* refer to a group of people who teach elementary or secondary institutions. In the postsecondary context, *faculty* relates to all people who hold full- or part-time teaching positions (Hora, Bouwma-Gearhart, & Park, 2017). The term *faculty*

member will distinguish individual faculty, such as a teacher. Lessons learned in the body of empirical research on teachers can highlight faculty data use.

Institutional Research

Institutional research (IR) offices in higher education are integral to addressing federal and state accountability reforms and informing campus decision-making and planning (Brown, 2017; Brown, Hewitt, Lin, & Vater, 2017). The emphasis on accountability and the data used in higher education is evident in funding priorities based on metrics like degree completion, transfer rates, and overall enrollment (Brown, 2017). IR offices have typically been central in institutional responses to accountability mandates used as resources for data needs across the campus, from student learning outcomes to institutional performance metrics (Morest, 2009; Swing & Ross, 2016; Terenzini, 2013). Members of IR offices maintain longitudinal data systems to create reports and conduct analyses, provide training on using these reports and systems, and utilize the data systems to support planning and decision making across the organization (Brown, 2018; Morest, 2009; Morest & Jenkins, 2007).

IR offices are part of a newer strand of accountability referred to as *institutional effectiveness*. Brown (2018) explained the concept of institutional effectiveness combined three areas of accountability: (a) required reporting mandates (e.g., accreditation), (b) learning assessments (e.g., student learning outcomes), and (c) organizational effectiveness (e.g., strategic plans, goals, and key performance indicators). Swing and Ross (2016) proposed a paradigm of institutional effectiveness and viewed the IR offices as evolving from mainly responding to accountability requirements to working with stakeholders across the organization. The researchers offered a realignment for IR office members to assume roles beyond keeping and reporting data for upper management instead of focusing on providing data to support and

empower all stakeholders as change agents for the institution (Swing & Ross, 2016). IR office members embracing an institutional effectiveness paradigm (Brown, 2018; Swing & Ross, 2016) will need to work closely with faculty as critical stakeholders (Kirby & Floyd, 2015). The IR office members aim to collect institutional data, transform those data into useful information, and disseminate results to manage and evaluate programs and processes (Rice, 2011). IR office members can use technology and data analysis advancements to develop additional tools, such as data warehouses, business analytics, and data dashboards (Brown, 2017). The IR office members' perspectives provide a lens to view how faculty use data within the organization for decision-making and better understand how data use can relate to organizational change (Terenzini, 2013).

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Educational data are used at various levels of the organization. Data used at the macro-level (e.g., state or government agencies) are typically collected systematically and analyzed across a state, district, or school (Ikemoto & Marsh, 2007). Data use for educators within an institution refers to how data about students are collected, organized, and analyzed about students (Wayman, Jimerson, & Cho, 2012). Another definition of data use refers to a “structured, evidence-informed inquiry process that results in decisions aimed at improving teaching and learning” (Jimerson & Childs, 2017, p. 587). Researchers of this definition focus on data the teacher uses for guiding instruction.

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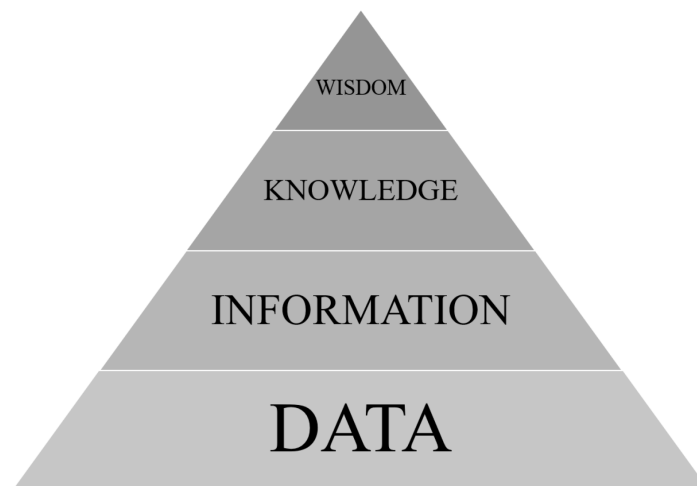


Figure 1. Ackoff’s data-information-knowledge-wisdom pyramid.

Theoretical Framework

This literature synthesis shows factors contributing to faculty use of educational data for their practices and Bronfenbrenner’s (1979) ecological systems theory (EST) to focus on faculty

at the center of the nested ecosystem. EST theorists provide a framework to examine factors in the faculty environments that may affect how faculty use data for their instructional practices. Using a nested EST (Neal & Neal, 2013) as a framework may show the reciprocal and multidimensional nature of the interactions within and between the faculty. These systems shape faculties' beliefs, thoughts, decisions, and actions (see Figure 2).

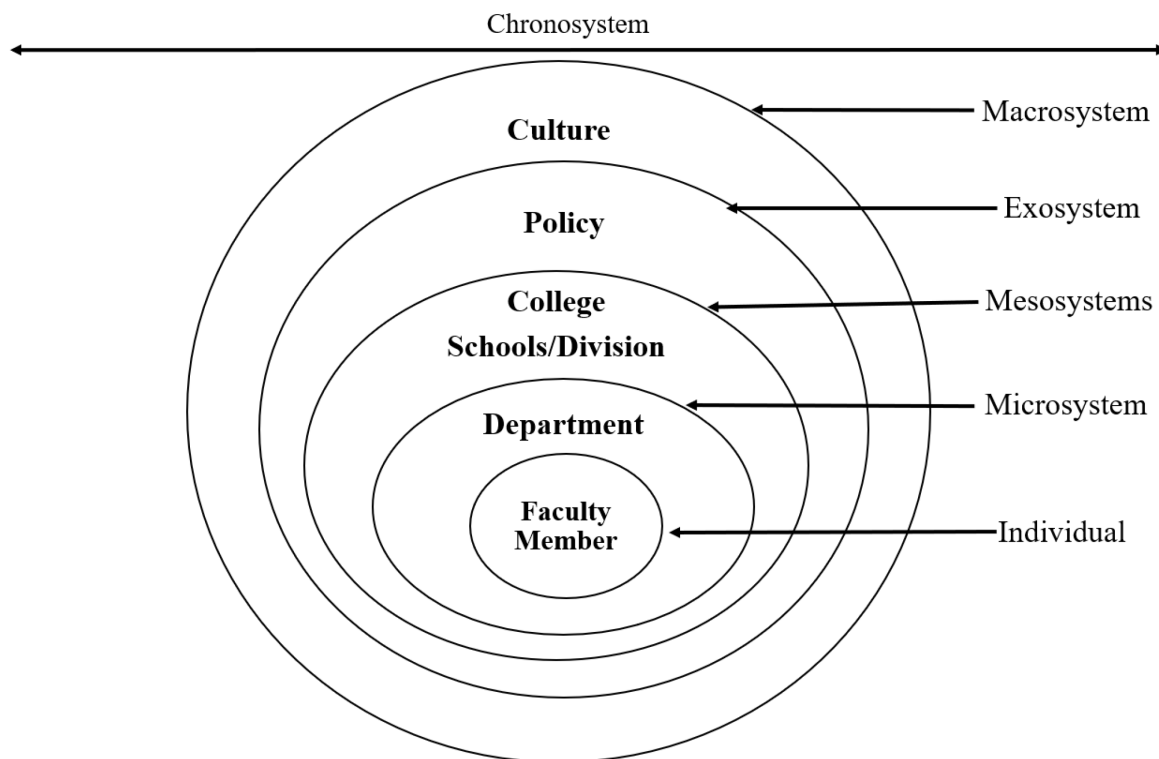


Figure 2. Nested model of ecological systems for faculty.

Note. The faculty is the focal point and the systems that influence the use of data emanating outward. Adapted from “Nested or Networked Future Directions for Ecological Systems Theory,” by J. Neal and Z. Neal, 2013, *Social Development*, 22, p. 725. Copyright 2013 by John Wiley & Sons Ltd. Adapted with permission.

The chronosystem is considered as levels across time that influence the ecological system; for example, the history of teacher education practices and policies impacts current teaching practices. One can use the macrosystem to examine overarching cultures, beliefs, and norms surrounding the prior three components of the ecosystem (Bronfenbrenner, 1979). In the

faculty's macrosystem are external influences more removed from the faculty's working environment than other systems, showing how society views educational data.

One can use the exosystem to describe factors in the work environment that seldom interact with faculty but still influence their views on education, including state and district educational policies (Bronfenbrenner, 1979). Nested within the exosystem are the mesosystems showing interactions among faculties' microsystems. The mesosystem shows interactions between the individual faculty in different microsystems. For example, faculty are part of a department, and many departments make up a division in the college.

The faculty member is at the center of the concentric circles representing the various systems in EST. The microsystems of the faculty are the most salient factors in understanding faculty data use and include access and interactions with data systems, past experiences with data, ability to analyze data, and influences of peers. Faculty roles in the organization, activities, and interpersonal relationships experienced in a social setting, such as the classroom, talking with their peers, or meeting with a supervisor, are influential in shaping how faculty view their environments and cultures. In addition to faculty members' educations or past experiences, these interactions at the microsystem shape their attitudes and beliefs about using data.

Conceptual Framework

A conceptual framework illustrates the community college context and interactions between the IR office and faculty using data. The IR office is embedded in a microsystem with factors that influence the development and distribution of data and reports used by faculty. A primary external driver in setting priorities for the IR office entails accountability reporting, including producing mandated state and federal data reports and institutional data metrics. IR office members usually develop and maintain data and business intelligence systems to respond

to accountability mandates. Although administrative leadership is usually the primary requestor of information from the IR office, faculty are major stakeholders who use IR data. IR office members aim to understand the needs of faculty better to support their use of educational data. The microsystem of the faculty is a significant construct in exploring faculty use of educational data. The constructs outlined showed how faculty members' experiences might shape their orientation toward using data. The conceptual framework in Figure 3 represents the conceptual factors that interact and potentially impact how the IR office can support faculty use of IR data.

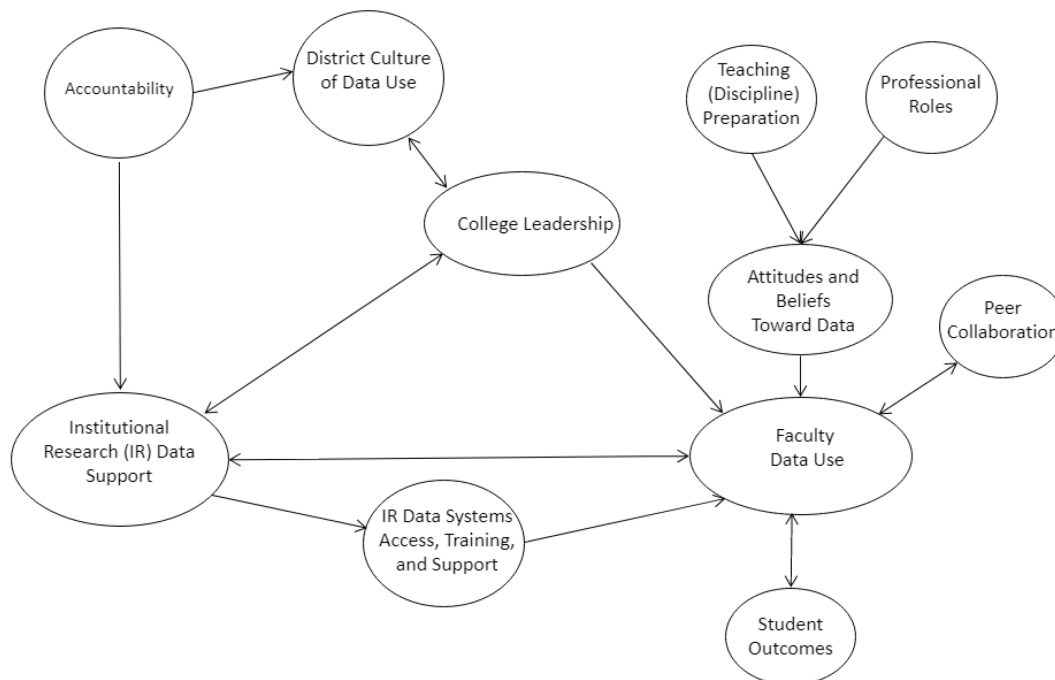


Figure 3. Conceptual map of institutional research data support and faculty data use.

Research on Teacher and Faculty Data Use

This section shows the literature on the factors contributing to faculty members' data use in their instructional practices. Achieving the Dream: Community Colleges Count (ATD), created in 2004 by the Lumina Foundation (2021), was a national initiative designed to improve educational outcomes for community college students who traditionally faced barriers to

academic success. The initiative was built on the importance of faculty and staff using data and research to improve the quality of programs and services. Researchers examined educators and faculty use of student data in achieving improved outcomes for disadvantaged groups of students. The ADT research is the most extensive study on community college educators' data use to date (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). However, empirical research on postsecondary faculty remains limited, and recent scholars have drawn on the vast body of literature in the K-12 contexts to frame how postsecondary educators and faculty use data to guide instructional decisions (Hora, 2012; Hora et al., 2014, 2017; Hora & Smolarek, 2018). These studies indicate that many of the factors found in K-12 literature that impact how teachers use data can also be applied to a postsecondary educational environment (Hora, 2012; Hora et al., 2014, 2017; Hora & Smolarek, 2018). In this review, studies found to impact K-12 teachers' data use were applied to higher education research to present a more robust assessment of factors related to community college faculty use of educational data.

External influences on teacher data use. Faculty use educational data based on accountability policies' requirements to spur educators to act. Faculty who use data systems to generate reports and dashboards expect that the information is used for institutional improvement or specific student learning outcomes. The following section outlines research on the types of external policies and systems that may influence a teacher's use of data.

Accountability. Accountability in education is the notion that educational institution leaders handle results and desired outcomes (e.g., improved test scores or increased degree completion). Accountability is enacted through laws interpreted by leaders of state and local policies. Many researchers refer to pressures of accountability as drivers for school leaders and

teachers to use data (Dejean et al., 2018; Dunn et al., 2013a; Farley-Ripple & Buttram, 2015; Hora et al., 2017; Jimerson, 2016; Levin & Datnow, 2012; Luo, 2008).

Leaders of state and local policies create structures for a teacher's school environment. How leaders of organizations or administrators enact these policies become part of the school culture and impact a teacher's data use (Kallemeyn, 2014; Marsh & Farrell, 2015). Many teachers remain aware of external accountability standards on which the school is evaluated. Still, many do not always feel accountability policies affect their work in the classroom (Jimerson & McGhee, 2013).

Jimerson and Childs (2017) conducted a recent study in Texas and evaluated over 1,000 policy documents to understand how data and data use were defined for accountability purposes. Five primary components of effective data framed the study: (a) a positive culture of data sharing; (b) use of various data towards a goal of achievement and narrowing gaps; (c) data inquiry for leaders, teachers, and staff; (d) technical and professional data support; and (e) data analysis for equity and campus safety (Jimerson & Childs, 2017). The researchers found that local district policies and practices were clear on the expectation that leaders (e.g., principals and superintendents) should use data to monitor performance and improvement but did not find much evidence of documents that referenced teachers' use of data. There was also little evidence within the policy documents on professional learning for teachers' use of data (Jimerson & Childs, 2017). The researchers found a misalignment in how leaders of state and local policies approached data use. Many leaders of current state-level policies stated administrators could use data to evaluate school-level performances, but few policies contained any language that teachers should use data for class-level improvement.

Hora et al. (2017) conducted a study comprised of interviews and observations with 59 faculty at three large public universities. The researchers examined accountability policies to understand whether leaders of universities required or encouraged faculty to conduct formal evaluation processes using defined data collection, analysis, and reflection. Most faculty reported using data from student assessments, end of the semester evaluations, and discussions with colleagues to make decisions about instructional practice and, at times, stated these data were influenced by policies for courses, programs, or departmental reviews (Hora et al., 2017). Some faculty had requirements from external accrediting agencies to collect data about student learning in specific competency areas, spurring faculty members' use of data. Faculty knew these requirements must be met for re-accreditation purposes (Hora et al., 2017).

Teacher preparation. Several researchers surveyed over 800 undergraduate schools with education majors. The students were asked questions to understand if they took classes that developed their use of data for their teaching practices (Mandinach, Friedman, & Gummer, 2015). The researchers examined how teachers learned to use various types of educational data, such as student assessment and behavioral data, data on school climate, and longitudinal outcomes. The researchers defined data literacy as collecting, analyzing, and interpreting data and transforming information into actionable instructional knowledge and practice to understand how these data would determine teachers' lesson planning (Mandinach & Gummer, 2016). The researchers found that most students did not learn how to use data in their undergraduate preparations and found only one educational program about using data. Faculty of teacher certificate programs did not incorporate data literacy into their classes. Many teachers did not feel confident in analyzing education data effectively for their practices. The researchers

expressed the need for more courses on data literacy added or incorporated into the program (Dunn et al., 2013a; Jimerson & Wayman, 2015; Mandinach et al., 2015).

Teachers may need other support to increase their abilities and comfort levels with using data in their practices. School leaders turn to professional development, such as 1-day data summits or workshops (Jimerson & Wayman, 2015). The researchers found that one-time professional learning might not be enough for teachers to use data more regularly and know how to incorporate data into their teaching. The researchers recommended that teachers needed time for ongoing discussions during the school year to develop their abilities to use data (Jimerson & Wayman, 2015). In the postsecondary context, Hora et al. (2017) hypothesized that faculty in higher education generally did not get trained in how to teach their disciplines using educational data. The researchers found that faculty were comfortable using data in their fields but were less comfortable using educational data on their students or their instructions.

Leadership and data use. The organizational culture of a school or institution may influence how teachers view and act on using data. Researchers have described data culture as data practices that organization leaders engage in to conduct work and include shared language and tools (Hora et al., 2017; Spillane & Kim, 2012). Leaders can frame using data as an individual or collective responsibility by establishing data protocols and activities. Leaders create an atmosphere in data use for teachers to have time to work and learn together.

The leader of a school (i.e., a principal) is a central component in creating an environment to provide affordances or constraints to teachers' collaboration on data for their teaching (Datnow, Park, & Kennedy-Lewis, 2013). Researchers have focused on the role of principals to understand how leaders create an influential data culture. Luo (2008) surveyed 289 principals in public high schools in the Midwest to explore principals' data use for different

decisions. Luo described a principal's data use as situational and multidimensional.

Multidimensional factors included (a) human-related factors, such as the feelings about data quality and analysis skills; (b) organizational factors, such as requirements from the district on what data are used for evaluating a school and the leadership; and (c) leadership factors, such as visioning or collaborative partnership. The researcher found that principals were more likely to use data for instructional and operational decisions when accessing types of data commonly used for these decisions (e.g., budget data and class size). Luo found that principals were less likely to use data in these types of decisions if the decision a principal needed to make did not have quantitative or numeric data (e.g., collaboration and shared vision).

A researcher of an elementary school with high-performance metrics conducted a case study on the school's principal, who firmly believed in using data. The researcher explored organizational routines that created a culture of data use and found three areas that contributed to creating a robust data culture: (a) dedicated time to use data (e.g., weekly scheduled meetings to discuss data), (b) facilitated work with peers (e.g., professional learning teams with coaches), and (c) leadership that empowered and supported teachers to use data for collaborative inquiry (Kallemeyn, 2014). The principal created a climate where teachers trusted his leadership and valued having professional development to learn how to use and discuss data with their peers (Kallemeyn, 2014).

Other researchers have explored various characteristics of principals and other school leaders to understand how they establish a healthy data culture (Levin & Datnow, 2012; Marsh & Farrell, 2015; Spillane & Kim, 2012). Spillane and Kim (2012) conducted a 2-year study with 30 elementary schools and found that the principal might not be the only leader who influenced data use. The researchers distinguished between other leaders in the school beyond the principal (e.g.,

assistant principals and department leads) and found that these leaders had more influence than the principal when engaging other teachers to use data. Informal leaders were called part-time leaders who were regular classroom teachers with positions as department leaders or project leaders. The researchers also defined formal and informal organizational structures to study informal leaders and the principal, showing how workers in these networks influenced decisions. In the informal networks, part-time leaders had relationships with other teachers and staff, helping teachers use data outside of the formal meetings or workshops that the principal or other formal leaders organized. The researchers concluded the principal remained vital in setting the tone for the institution, and collaboration was critical to engender data use by teachers through the school (Spillane & Kim, 2012).

In an exploratory study of leaders from 15 community college districts in Iowa, the researchers found that if administrative leaders believed they had a data culture at the college, the data use for student success was high (Dejean et al., 2018). Among STEM faculty at three public universities, where researcher explored cultural and contextual factors in faculty data use, Hora and Smolarek (2018) found that faculty did not have time to use data due to their workloads. Hora and Smolarek discussed how leadership could address the lack of engagement with data at universities by creating priorities to support the use and involvement of data in K-12 environments (Kallemeyn, 2014; Levin & Datnow, 2012).

Teacher factors in data use. The act of using data to make decisions involves complex cognitive processes. Current education researchers have focused on teachers' behaviors and attitudes to understand why they chose to use or not to use data, what data they used, and how they used those data for their practices (Mandinach, 2012; Mandinach & Gummer, 2015). The researchers of K-12 have studied microsystem factors on teachers' beliefs, attitudes, experiences,

and use of data to inform their practices (Dunn et al., 2013a; Jimerson & McGhee, 2013). The following section contains a discussion of the significant conceptual factors studied in teachers' use of data.

Access to data. In understanding how teachers use data in their practices, one of the first steps entails determining if data on students are available and accessible to teachers and if they are aware and want to use those data (Dunn et al., 2013a; Jimerson & Wayman, 2015). In K-12 systems, data sets include aggregated data on schools' student populations, including demographic information and performances on standardized tests. Dunn et al. (2013a) studied if teachers knew where and how to get data, had comfort with technology to understand their self-efficacy in data access, and if the retrieval was a barrier to using data in their practices. Similarly, Jimerson and McGhee (2013) explored teachers' abilities to access data using a district's data system. Both studies showed that if teachers had been trained on the data systems, such access did not pose any issues or barriers to teachers' use of data.

Current literature on higher education data systems and faculty access to these types of data are limited. Hora and Smolarek (2018) explored how faculty used data in their teaching practices and asked them about the kinds of data used. Faculty mainly used data related to using tools to teach (e.g., clickers, learning management grade books) and did not use data about their students' performances in their classes (Hora & Smolarek, 2018). In an inquiry about data quality, faculty in the study believed that data quality was poor. In particular, the end-of-semester evaluations by students were usually sparse, and faculty expressed that it was challenging to use these evaluations for anything meaningful (Hora & Smolarek, 2018). Also, in this study, faculty did not use data to address struggling or failing students in their courses (Hora & Smolarek, 2018).

Data systems. An institutional barrier to using data may be the data system developed for teachers (Dunn et al., 2013a; Jimerson & Wayman, 2015; Wayman et al., 2012). School district leaders have invested in technology to address organizational performances on student achievement and other outcome data to assume that employees will embrace the system and use data to make decisions (Cho & Wayman, 2015). The promise of technology improving educators' use of data many times fails because of poor planning when implemented. Leaders simply investing in these systems does not always lead to improved data use or student outcomes (Cho & Wayman, 2015). Like data systems, the promise of learning analytics (LA) has increased; thus, Klein, Lester, Rangwala, and Johri (2019) explored the implementation and use of LA in higher education. The researchers conducted a case study in 2015 at a large public university over six months to explore creating new LA teaching and advising tools. The researchers conducted focus groups, interviews, and observations of six faculty and 21 advisors of multiple colleges, schools, and departments. The researchers defined organizational structures, commitment, and leadership as significant factors in the success or failure of adopting faculty using these tools.

Attitudes, beliefs, and efficacy in data use. A teacher's confidence in using data for decisions significantly influences their use of data (Dunn et al., 2013a). Researchers have used efficacy and anxiety when examining a teacher's ability and willingness to use data for decision-making (Dunn et al., 2013a; Jimerson & McGhee, 2013). In these studies, researchers defined efficacy as the level of confidence a teacher had in accessing data, using technological tools, and knowing how to use data reports, including understanding statistics and how to apply what they learned from those data (Dunn et al., 2013a). Efficacy in using data can also mean seeing the benefits of using those data regularly and collaborating with other teachers (Jimerson &

McGhee, 2013). Dunn et al. (2013a) described anxiety as a teacher's concern that impeded using data related to their practices. Data anxiety or concerns can also occur because of past negative experiences in how data are used or teachers' worry that they cannot apply data to their practices (Jimerson & McGhee, 2013).

ADT researchers explored faculty using data and examined which factors showed correlations to increased data use (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). The researchers found that the perceived usefulness of student data related to more use of student data. If a department regularly used data, faculty in those departments used data more than others. The researchers also found a weak correlation if faculty believed that student data did not relate to faculty jobs. If faculty did not trust the college's data, they used data less frequently than others (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013).

Confidence in data use. In a study on teachers' self-efficacy with data, some researchers surveyed teachers from over 500 elementary and secondary schools about their abilities to use data in their classes and with students (Dunn et al., 2013a). The teachers recognized using data as necessary but did not always believe that they could use data effectively. The researchers found that teachers frequently questioned if they interpreted the information correctly (Jimerson & Wayman, 2015). The researchers found that the less efficacious the teacher felt about using data, the less engaged they were in using data for decisions (Dunn et al., 2013a). Another reason a teacher may feel they cannot use data is that they do not think those data are appropriate to use, or they need more trustworthy data. Some teachers expressed that test scores did not represent a student's learning. The researchers hypothesized that more data related to teachers' subjects and classroom assignments would be more beneficial than other data (Jimerson & McGhee, 2013).

In an exploratory study, Hora et al. (2017) interviewed and conducted classroom observations to examine cultural practices of data use of 59 science and engineering faculty at three large public universities. The researchers answered questions on the types of data faculty used for their teaching as characteristics or patterns in these practices. Although faculty in the study felt comfortable using data within their disciplines, they did not analyze data about their students because they thought they did not have the experience or expertise for this application (Hora et al., 2017).

The researchers highlighted that some faculty lacked the skills to use educational data, analyze assessment data, look for patterns, and construct implications for their teaching practices. Some faculty wanted more professional development on using student data in their teaching practices (Hora et al., 2017). ATD researchers also found faculty did not have the skills to analyze data used data less (Jenkins & Kerrigan, 2008). The researchers also hypothesized that faculty in higher education generally did not know how to use assessment data for their teaching. Teachers were familiar with using data for their discipline but were not always confident in using data to inform their teaching practices (Hora et al., 2017).

Concerns in data use. One type of anxiety or worry can be in teachers' abilities to understand, analyze, and interpret data using scaled scores or understanding statistics. Teachers avoid using data because they think they are not interpreting the data correctly or believe they do not have the skills to analyze those data (Jimerson & McGhee, 2013). Teachers may not use data because they are worried; thus, they do not know how to use those data in feedback to students (Jimerson & McGhee, 2013).

Dunn et al. (2013a) studied the relationship between a teacher's efficacy and concerns about adopting data for decision-making. The researchers analyzed surveys from 537 K-12

teachers. The researchers found that if a teacher felt efficacious in using data for their practices, they were less worried about consequences and more likely to collaborate on data use than others (Dunn et al., 2013a).

Dunn et al. (2013a) measured a teacher's anxiety of using data based on a scale that measured teachers' concerns about adopting innovation. Jimerson and McGhee (2013) also studied the fear of teachers using data in a study of 154 educators in a small school district in Texas. The type of anxiety examined in their study was anxiety about data being used to shame or punish teachers for increasing unhealthy competition (Jimerson & McGhee, 2013). Jimerson and McGhee (2013) found that if teachers had the experience where educational data were used to shame others or create unhealthy competition, they would be less likely to use data in their practices.

Dunn et al. (2013a) identified three factors that supported a teacher's efficacy in data use: (a) knowing how to data, (b) having the ability to understand and apply data to their classes, and (c) negative experiences in using data impact a teacher's efficacy in data use. The researchers found a significant relationship between a teacher's negative experience with using data and data efficacy. The more positive experiences with using data a teacher report, the higher teachers' feelings of being efficacious were in using data (Dunn et al., 2013a). The researchers also found that if teachers' data efficacy was high, they were more likely to collaborate with other teachers to use data in decisions.

Jimerson and McGhee (2013) explored how educators felt about using data and surveyed 154 school leaders, teachers, and professional support staff at a small school district in Texas. The survey results seemed favorable toward leaders' data use. Teachers' responses showed commitment to using data and seeing the benefits of data coupled with low anxiety levels

(Jimerson & McGhee, 2013). However, in the review of the open-ended survey data, responses were mixed from excitement to stress and frustration about using data (Jimerson & McGhee, 2013). Teachers were also skeptical that using data made any difference and were more negative toward accountability (Jimerson & McGhee, 2013). In further analysis of the data, the researchers discovered teachers who realized the benefits of using data were willing to commit time to use data (Jimerson & McGhee, 2013). The researchers also found that if a teacher had reported anxiety about using data, they had past experiences of misuse or abuse of data (Jimerson & McGhee, 2013).

Peer collaboration in data use. Teachers who use collaborative inquiry when using data can support others using data (Jimerson, 2016; Jimerson & McGhee, 2013; Jimerson & Wayman, 2015). Researchers have studied social learning and building capacity as essential aspects of data use (Hora et al., 2017). People of social networks and connections to leaders who can influence the use of data are other considerations to strengthen collaboration for data use in schools (Farley-Ripple & Buttram, 2015). Professional learning should be embedded in ongoing organizational routines to support teachers using data in teams (Datnow et al., 2013; Kallemeyn, 2014).

Spillane and Kim (2012) studied various levels of leaders in schools and informal leaders (e.g., teachers who mentored other teachers or grade-level leaders) and their influences on other teachers. The researchers found that informal leaders in schools had more impact on other teachers than the principal about using data for their teaching. The researchers indicated that peer learning might have a more substantial influence on data use than other forms of professional education.

Community college social capital and data use. A researcher of an exploratory study of social capital in community college data use, surveyed administrators, and faculty at 41 colleges in seven states. The researcher gathered responses from 2,417 faculty and 1,591 administrators (Kerrigan, 2015). Three forms of social capital were explored in the educators' data use: (a) social trust and relationship building, (b) communication channels, and (c) norms and expectations. In the area of social trust and relationship building, the researcher asked educators about the length of time educators had been at their colleges and how often they collaborated using data. The researcher did not find any relationship between data use and the number of years at the college or how often teachers collaborated. The researcher hypothesized longer lengths of time for educators at the college might impact developing mistrust and lessen data use (Kerrigan, 2015). Another rationale was that many college leaders instituted significant changes for using data that might have impacted trust and collaboration.

Regarding communication channels, the survey items included how often faculty in departments met to discuss student outcome data or participated in training or professional development on analyzing data. The researcher found a strong relationship between the presence of communication channels and the use of data. The researcher discussed that communication channels could support developing social capital “by providing avenues for sharing desirable behavior, by increasing opportunities for groups to develop and share existing knowledge, and by creating venues to share new knowledge” (Kerrigan, 2015, p. 613).

Leaders of practices that reinforce norms and expectations for using data examined beliefs about using data as part of teachers' jobs and departmental decisions. Faculty generally agreed using data was part of their jobs, and faculty members whose departments used data for decisions used data more than other faculty members whose departments did not use data. The

researcher found variations across departments and suggested that department leaders, such as academic department chairs or administrative directors, could play a role in communicating the use of data as a norm (Kerrigan, 2015).

Data use and student outcomes. Understanding how using data can change instructions for improved student outcomes is the end goal of DDDM. Cox et al. (2017) examined data in five states on first-year university students to find connections to using data to examine students' experiences or outcomes. The researchers found that school leaders embraced using data but could not link this adoption to any changes or gains in student engagement. Although these researchers found little connection to using data and improving student outcomes, recent researchers found the impact might not be realized in improved student outcomes but to changes in a teacher's practice. Supovitz and Sirinides (2018) conducted an exploratory randomized controlled study with 64 teachers in 27 professional learning communities at a mid-sized suburban K-12 school district. The researchers hypothesized that teachers know using data was important for student outcomes, but the connection to how teachers change their practices when using the data was more important (Supovitz & Sirinides, 2018). The researchers examined feedback provided to teachers when they used data for their teaching and if this feedback affected their views on using data for their instructions (Supovitz & Sirinides, 2018). The researchers found moderate, significant changes to student performances with teachers who used data. Still, the researchers saw substantial impacts on how teachers perceived data could help changes their instructional practices (Supovitz & Sirinides, 2018).

Creating a culture of evidence for improvements is a central strategy in ADT. A major finding in ADT research entails producing changes in culture and practices using a long process of data collection (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). ADT researchers do

not address student outcomes and relationships to increased data use. Although stakeholders may want to see how data use is correlated and causes improved student outcomes, this subject has yet to be confirmed in data use research.

A newer research track entails engaging students to use their data (Jimerson, Cho, & Wayman, 2016; Jimerson & Reames, 2015). Jimerson and Wayman (2016) used the term *student-involved data use* to describe a practice where teachers “work to purposefully and directly engage students in the tracking and analysis of their learning data” (p. 413). In an exploratory study, Jimerson and Cho (2016) interviewed 11 elementary school teachers from five districts in north-central Texas. The teachers practiced student-involved data use considered exemplars. Initial findings reflected three themes similar to earlier factors in teacher data use: (a) more professional learning is needed to understand if this activity was effective, (b) more time was required to prepare and work with students using their data, and (c) anxiety of how students reacted to interpreting their data, especially if the data were negative (Jimerson et al., 2016).

Conclusion

Members of an IR office seeking to support their faculty stakeholders explored the literature to understand empirical research in educational data use. The EST framed the exploration in the literature. Researchers examined schools of education and teacher preparation for data use at the chronosystem level but found that most teacher education curricula lacked data use concepts. More research is needed to understand systemic data use education for K-12 teachers (Mandinach et al., 2015). Initial research in the postsecondary context indicates that faculty may be comfortable using data for their disciplines but lack experience in educational data analyses (Hora et al., 2014, 2017; Hora & Smolarek, 2018; Kerrigan & Jenkins, 2013).

Research on accountability at the exosystem level showed that most external factors did not seem to influence or increase a teacher's use of data (Jimerson & Childs, 2017; Jimerson & McGhee, 2013; Wayman, 2005). In higher education contexts, accreditation may influence some use of data, but accountability efforts seem to have less influence on faculty using data (Hora et al., 2017). However, leadership in the organization is essential for creating an environment conducive to data use (Kallemeyn, 2014; Marsh & Farrell, 2015; Spillane, 2015; Spillane & Kim, 2012).

The most salient data use factors in a teacher's microsystem included access to data, attitudes, beliefs, and efficacy in using data (Dunn et al., 2013a; Hora et al., 2014; Jimerson & McGhee, 2013). The research showed that these factors did not occur in isolation and teachers' experiences intersected with their confidence and concerns about using data in their practices. Peer collaboration around data use may build trust and lessen concerns. The research in higher education indicated that future researchers should explore similar factors for teachers in the K-12 context further with faculty (Hora et al., 2017; Hora & Smolarek, 2018; Jenkins & Kerrigan, 2008; Kerrigan, 2014, 2015; Kerrigan & Jenkins, 2013).

Chapter 2: Assessing Faculty Data Use

The literature review in Chapter 1 included research on data use in elementary and secondary schools, as fewer empirical studies on educational data use in postsecondary institutions were available (Hora & Smolarek, 2018; Kerrigan, 2014). Hora et al. (2017) stated, “Thus, a pressing question facing higher education is whether the lessons learned from the DDDM (data-driven decision making) movement in K-12 school will be heeded, particularly insights gleaned from practice-based research regarding the importance of understanding local data cultures” (p. 3). Critical factors in the literature pointed toward exploring faculty data cultures, attitudes and beliefs about using data, accessing data, applying data to practice, and opportunities for collaborative inquiry.

Community College Institutional Research Context

Members of IR offices are increasingly being asked to work closely with faculty and support how to improve student outcomes and institutional performances (Kirby & Floyd, 2015; Swing et al., 2016; Terenzini, 2013). In this study, community college IR office members sought to improve services to support faculty use of educational data. The literature review showed critical teacher data use constructs to explore in the community college district. These data use constructs offered a framework to identify faculty data use needs. The IR office members had an extensive educational data warehouse of many reports on courses, programs, and students. Faculty in the district could access the IR data warehouse, and various software tools could be utilized to create reports or dashboards. Throughout the study, the IR data warehouse was the primary data system that provided data to faculty.

Purpose of the Study

The purpose of the needs assessment study was to explore the data culture of a community college district on the West Coast and how community college faculty viewed educational data for their teaching practices. From this needs assessment, the researcher sought to answer the following research questions:

RQ1: What is the culture of using IR data at the college?

- a. What are faculty beliefs and attitudes about using IR data?
- b. What benefits do they see in using IR data?
- c. What concerns or anxieties do they have in using IR data?

RQ2: How do faculty access data from the IR data warehouse?

- a. How do faculty think they should use IR data?
- b. What types of data do faculty find useful?
- c. In what ways do they use data to inform their teaching practice?

Measuring Data Use Factors

Jimerson (2016) noted a lack of data-use-related instruments, particularly ones to measure teachers' beliefs and attitudes. The researcher developed the Survey of Data Use and Professional Learning (S-DUPL). The researcher used the S-DUPL to create measures around themes in the literature: (a) teachers' data use and related skills, (b) data culture at the school, (c) shared vision in the use of data, and (d) teachers having time to use and collaborate with others to make sense of the data. After the initial development of the instrument, 12 expert reviewers participated in a cognitive interview process to strengthen the instrument, and they continuously revised items during the cognitive interview process (Jimerson, 2016). The instrument then went through one small pilot test of 34 participants and two more extensive tests with 184 and 120

participants, respectively; all three pilots were conducted via convenience sampling (Jimerson, 2016). Statistical analysis of the scales was completed, and six significant scales emerged: (a) educator confidence in skills and abilities to data use, (b) effectiveness of data-related professional learning, (c) construal or utilization of data to inform instruction, (d) benefits of using data, (e) anxiety of data misuse or abuse, and (f) culture of collaboration (Jimerson, 2016). The S-DUPL was adapted for the community college context of the study, called the Faculty Survey of Data Culture and Data Use (FSDCDU) in this study, as described in the instrumentation section of this chapter.

Method

An explanatory sequential mixed-method design was used to inform this needs assessment (see Lochmiller & Lester, 2017). The explanatory sequential mixed-method design was chosen to use two methods of analysis. First, an adapted version of Jimerson's (2016) S-DUPL was constructed to measure constructs on faculty data use in community colleges in the literature review. The statistical results of the instrument and the themes in the comments helped identify constructs to explore in interviews with individual faculty further. The survey results were analyzed quantitatively and qualitatively. The qualitative analyses included a priori and thematic coding on open-ended comments in the survey and interview transcripts. The following sections include descriptions of participants, instruments, data collection, and data analysis of the study.

Faculty participants. The population included full- and part-time faculty at two community colleges within a district on the West Coast. This population was appropriate for examining the POP. All faculty had access to the IR data warehouse.

The IR data warehouse had numerous instructional reports that could be accessed through the employee portal at any time. The district had approximately 1,200 full- and part-time instructors. Surveying all the faculty provided the best opportunity to capture a large enough sample of data to test the constructs in the FSDCDU. The active faculty teaching in the Spring 2019 semester in the district included 388 full-time faculty and 855 part-time faculty. The gender percentage of faculty was approximately 56% female and 44% male. However, the employee data did not report nonbinary or declines to state rates.

As part of the informed consent and confidentiality, this study was part of the blanket Institutional Review Board provided by Johns Hopkins University. The population sampled was over 18 years of age. Additionally, the required language for a survey consent was written in the survey introduction before the participant answered questions on the survey. The executive sponsor of the researcher reviewed research studies conducted in the district and approved the survey instrument and study.

After the survey closed, 35 faculty who took the survey volunteered for interviews. In selecting faculty to interview, the various selection criteria were considered. The goal of the interviews was to understand better faculty data use from groups that might not interact or be familiar with the IR office. IR office members worked with committees at colleges to develop program review data used by department chairs. Thus, department chairs were coded out of the selection. Fourteen faculty, seven males and seven females, were selected for interviews. The 14 faculty included a mix of full- and part-timers from both colleges, ranging from 3 to 17 years of teaching experience. Of the 14 selected, six volunteers met for an interview.

Instruments. Two instruments were used in this needs assessment to collect quantitative and qualitative information. First, the FSDCDU was administered with Likert-scale items and

open-ended text questions. After survey results were reviewed, six interviews were conducted using an eight-question interview protocol.

Faculty data use survey. The FSDCDU was adapted from S-DUPL (Jimerson, 2016) for a community college context. The six constructs adapted from Jimerson's (2016) S-DUPL included (a) data culture, (b) data access, (c) data construal or data use, (d) data benefits, (e) data confidence, and (f) data anxiety. Tables 1, 2, and 3 outline the six constructs adapted from S-DUPL, an operational definition of the construct, the final questions from the survey, and the references to the construct in the literature. An open-ended question was asked after each data construct to gather more descriptive information.

The FSDCDU instrument was reviewed twice in a cognitive-interview style (see Desimone & Le Floch, 2004) by a committee at one of the colleges in the district. This committee focused on educational assessments for faculty at the college. The committee established procedures and supports faculty to complete student learning outcomes, program review, and other related assessment initiatives. This committee comprised approximately 15 faculty from different disciplines. During a committee meeting, members of the committee reviewed the survey questions and provided feedback. The committee suggested ways to rewrite questions for better understanding by faculty and suggested other questions to be included in the survey. The survey was subsequently edited and brought back to another meeting two weeks later. A smaller subset of the committee read through the updated instrument and confirmed it was ready for faculty.

Table 1

Data Use Construct and Survey Questions: Access and Culture

Construct	Operational definition	Measures	Citation(s) for construct
Data access	Ability to access instructional data and navigate data systems (Jimerson, 2016)	Question 1 <ul style="list-style-type: none"> I access the district's data warehouse (inFORM) reports. I request data from the college or district research office. I have developed reports with the college or district research office. I have developed my own reports with data I've collected. I have analyzed data with a data coach at the college. I have analyzed data with a research analyst at the college or district. 	Dunn et al., 2013a; Hora & Smolarek, 2018; Jimerson & McGhee, 2013; Jimerson & Wayman, 2015
		Question 2 <ul style="list-style-type: none"> There is a data-driven culture in the college I teach. The leadership of the college use data to make informed decisions. The leadership of the district use data to make informed decisions. 	

Table 2

Data Use Construct and Survey Questions: Use and Benefits

Construct	Operational definition	Measures on a 5-point scale	Citation(s) for construct
Data use	Ability to see that the data are used to inform instruction (Jimerson, 2016)	Question 3 <ul style="list-style-type: none"> I use reports from our district's data warehouse (inFORM) to inform my teaching and/or daily practice. I use other data (not from the district's data warehouse (inFORM)) to inform my teaching and/or daily practice. I use data from colleagues to inform my teaching and/or daily practice. 	Dunn et al., 2013a; Hora et al., 2017; Jimerson, 2016; Jimerson & McGhee, 2013; Jimerson & Wayman, 2015
		Question 4 <ul style="list-style-type: none"> Data use helps me make informed decisions. Data use helps me make ethical decisions. Data use benefits educators and students. Data use is about continuous improvement in the classroom. 	

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree Nor Disagree, 4 = Agree, 5 = Strongly Agree.

Table 3

Data Use Construct and Survey Questions: Confidence and Concerns

Construct	Operational definition	Measures on a 5-point scale	Citation(s) for construct
Data efficacy	Confidence in skill and abilities related to using data (Jimerson, 2016)	Question 5	
		<ul style="list-style-type: none"> I can easily access and navigate the district data systems (data warehouse (inFORM) and MySite). I am comfortable collaborating around data with colleagues. I can formulate worthwhile questions to guide my data use. When I examine data reports, I am confident that my interpretations are accurate. Once I analyze data and draw conclusions, I know what action steps to take next. I am able to support others in learning how to effectively use data. 	Dunn et al., 2013a; Hora et al., 2017; Jimerson, 2016; Jimerson & McGhee, 2013;
Data concerns	Concern or worry regarding possible misuse or abuse of data (Jimerson, 2016)	Question 6	
		<ul style="list-style-type: none"> I worry that data will be used to shame or punish other departments in the college. I am concerned that data use will increase unhealthy competition among faculty in the college. I am concerned I do not have enough training in using the data. I am concerned that data use will increase unhealthy competition among faculty in the district. I do not trust the data that is used in reports at the college or district. 	Dunn et al., 2013a; Hora et al., 2017; Jimerson, 2016; Jimerson & McGhee, 2013; Jimerson & Wayman, 2015

Note. 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

The end of the survey included a set of optional demographic questions. The researcher used these questions to ask what college faculty taught, faculty tenure statuses at the college, what discipline they taught if they had ever been a department chair, how long they served as a department chair, their genders, and their ethnicities. The researcher presented an optional question to ask for volunteers to provide their contact information if interested in being interviewed.

Interview protocol. The interview protocol was developed to explore areas in the survey related to data use constructs and any other factors that influenced faculty use. Appendix A contains the protocol.

Data collection. The FSDCDU was emailed to all faculty on April 11, 2019 and remained open for approximately two weeks. After the initial email, two email reminders were sent once a week after the survey was emailed and three days before the closing. Additional email requests to faculty colleagues were sent to encourage their departments or other faculty members to participate in the survey.

Participants were selected for interviews after the survey data collection closed, and initial analysis of the data was conducted. Thirty-five faculty volunteered for interviews by providing their contact information at the end of the survey. Between May 15 to May 31, 2019, emails were sent to 14 faculty members to inquire if they would still like to volunteer for interviews. Of the 14 faculty members contacted, 10 agreed to the interviews. However, only six faculty members were available to meet. These interviews were conducted at the beginning of June 2019. Interviews lasted between 40 to 60 minutes in person, except for one interview conducted via a web meeting. The interviews were recorded with the software Otter.ai (2019), allowing for a more straightforward transcription process. The software produced a transcript from the audio recording. The transcripts were reviewed and edited to correct any errors.

Data analysis. The results from the survey data were analyzed using descriptive statistics and confirmatory factor analysis. An examination was conducted of participant responses to the open-ended comments items included at the end of each construct subscale in the survey. Once all the survey results were reviewed, interview questions were developed to explore constructs in the survey further. The interview transcripts were analyzed using an emergent design (see

Lochmiller & Lester, 2017) and a deductive or a priori coding method. Triangulation of the descriptive statistics results with survey comments and interviews provided a richer understanding of the constructs on data use. Additional emergent themes from the qualitative analysis were identified and analyzed.

Findings

The survey respondents included 124 faculty, resulting in an approximately 10% participation rate ($N = 1,243$) among the active faculty in Spring 2019. Although this rate was relatively low, working in the IR office and implementing many employee surveys over the last 10 years, it was challenging to solicit participation in surveys. The FDU survey response rate was like other employee survey participation rates conducted at the district. Slightly more full-time faculty (57%) participated in the survey than part-time faculty (43%). This ratio showed that more full-time faculty responded compared to the distribution of all full- and part-time faculty in a population, where full-time faculty represented 31% of all faculty, and part-time faculty represented 69%.

Demographics of the survey participants. This section provides a demographic picture of the faculty who took the survey. Tables 4 to 7 show collected data.

Table 4

Faculty Status

Category	Number of faculty	Percent
Full-time faculty	59	47.60
Part-time faculty	44	35.50
Did not answer	21	16.90
Total	124	100.00

Faculty who stated the college they taught at represented a close-to-even ratio at 42% College A, 53% from College B, and 5% teaching at both colleges.

Table 5

Faculty Location

College where faculty teach	Frequency	Percent
College A	43	34.70
College B	55	44.40
Both colleges	5	4.00
Did not answer	21	16.90
Total	124	100.00

Of the faculty who responded to how many years they taught at the colleges, the average number of years was approximately 11, with the fewest number of years being one and the highest being 45 years. Thirty-one faculty responded that they were or had been department chairs, and the average time in serving as a department chair was about four years.

Table 6

Faculty Years Teaching and Department Chair Items

Years of teaching and department chair	<i>N</i>	Minimum	Maximum	Mean	Std. deviation
How many years have you been teaching at College B or College A?	98	1.00	45.00	11.40	9.16
If you have been a department chair, how many years did you serve as a chair?	31	1.00	15.00	5.16	3.84

Eighty-seven faculty reported the discipline they taught, and the top seven disciplines that faculty reported included English, English as a second language, math, psychology, counseling, business, and environmental studies. Disciplines listed less than three times were grouped into the other category: accounting, dance, economics, kinesiology, library, music, anthropology, biology, chemistry, communications, education, geography, nursing, sociology, and writing. Twenty-six different disciplines showed a diverse variety of disciplines represented in the sample.

Table 7

Faculty Discipline

Discipline of faculty	Frequency	Percent
English	14	11
ESL	9	7
Math	9	7
Psychology	8	7
Counseling	7	6
Business	4	3
Environmental Studies	4	3
Did not Answer	37	30
Other	32	26
Total	124	100

Demographics of the interview participants. Of the faculty interviewed, three were full-time, and three were part-time. They were evenly split between the two colleges within the district. Most were female, and the years of experience ranged from three years to 11 years teaching in the district. The interviews provided an opportunity to member check and deepened understanding of the survey results. The researcher explored other factors in faculty data use.

Confirmatory factor analysis. A confirmatory factor analysis was conducted on the survey results with a net of 116 participants (see Figure 4). The items in the survey loaded on the initial six constructs as designed indicated strong construct validity. Key fit statistics were reviewed in the confirmatory factor analysis; Root Mean Square Error of Approximation (RMSEA) of 0.064; Confirmatory Fit Index (CFI); Tucker Lewis Index (TLI) of 0.891 and 0.874, respectively; and Standardized Root Mean Square Residual (SRM R) of 0.081 showed a reasonable fit to the six major factors in the survey. Conducting the confirmatory factor analysis supported the instrument's reliability in testing the six constructs in the literature review. Appendix B includes the items included in each of the six factors.

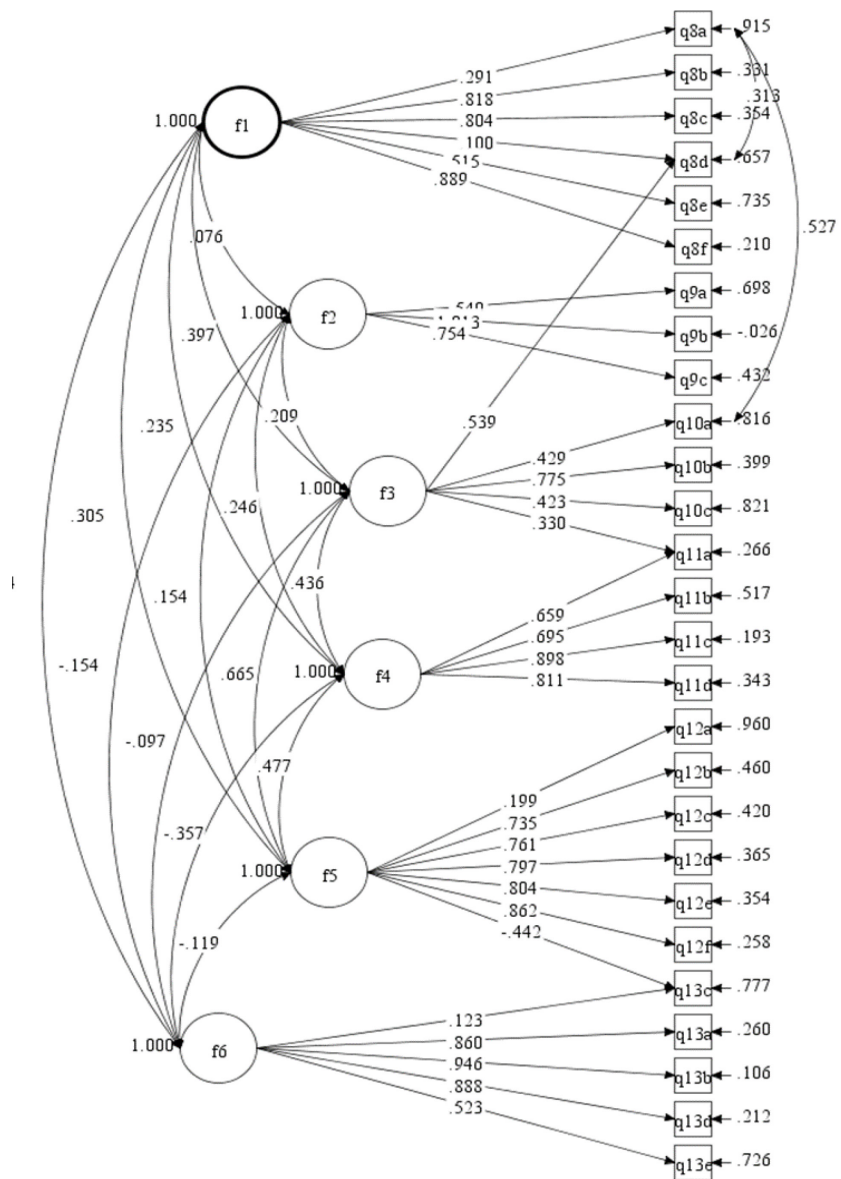


Figure 4. Confirmatory factor analysis.

The researcher explored the construct and responses to the survey questions further. The researcher computed a composite score for a combined average for each of the six constructs to review if any constructs had higher or lower scores than the other. The scores were sorted on the highest agreement or uses (see Table 8).

Table 8

Data Constructs Composite Scores

Composite	N	Mean	Std. deviation	Minimum	Maximum	Range
Composite benefits	113	3.94	0.76	1.00	5.00	4.00
Composite culture	124	3.42	0.70	1.33	5.00	3.67
Composite efficacy	108	3.42	0.72	1.17	5.00	3.83
Composite use	117	2.93	0.90	1.00	5.00	4.00
Composite concern	104	2.73	0.79	1.00	4.60	3.60
Composite access	124	1.85	0.72	1.00	3.50	2.50
Valid N (listwise)	104					

Note. Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

An initial review of the average composite scores showed that participants had the highest agreement with statements that confirmed the constructs of data benefits, efficacy, and the related construct, indicating an agreement on a culture of data use that existed in the colleges and district. However, faculty who completed the survey disagreed that they accessed and utilized data for their teaching practices. The concern over data use was negatively rated, so a lower score was associated with disagreement, meaning that participants did not have any concerns about how they used data.

A priori analysis of data use constructs. The survey was designed around six constructs based on the literature and Jimerson's (2016) S-DUPL: (a) data access, (b) data use, (c) data culture, (d) data benefits, (e) data efficacy, and (f) data concerns. The survey results for the questions grouped by construct were analyzed using descriptive statistics, confirmatory factor analysis, and qualitative coding of the volunteer faculty interviews. The construct questions were rated on a 5-point scale. The first construct of data access had the following point value and scale: 1 (*Never*), 2 (*Rarely*), 3 (*Occasionally*), 4 (*Frequently*), and 5 (*Always*). The remaining five constructs all had the following scale: 1 (*Strongly Disagree*), 2 (*Disagree*), 3 (*Neither Agree Nor Disagree*), 4 (*Agree*), and 5 (*Strongly Agree*).

The researcher used the review of the descriptive statistics to analyze the open-ended comments items and develop the interview protocol. The researcher presented the survey with open-text questions, asking for additional comments after each set of questions related to a data construct (see Appendix C). Fifty-three respondents (43%, $N = 124$) gave one or more comments to at least one of the six comments questions. The questions that received the most comments concerned data access (26%) and data concerns (24%). Although the open-comment questions aligned to specific data constructs, responses to these questions did not necessarily align with the data construct. Table 9 shows the number of comments received in each area.

Table 9

Number of Survey Comments Received by Data Use Construct

Survey comment by construct	Number of comments received in each question	% of all comments
Data access	32	26%
Data use for teaching	16	13%
Data culture	15	12%
Data benefits	21	17%
Data efficacy	10	8%
Data concerns	30	24%
Total	124	100%

Overall, 124 comments organized by the six data constructs were analyzed together with the six interviews. There were 12 data sources in the analysis: six survey comment areas and six interviews. A priori coding was used to code the initial survey comments and interviews. In subsequent coding sessions of the data, emergent codes and refinement into the data use construct were also coded. Thirty-three thematic codes were used in this analysis (see Appendix D).

Six a priori codes, one for each of the major data use constructs in the survey, were used in the first round of coding, and 12 major codes emerged. Table 10 outlines the major themes by

the data source (interview or survey participant comment) and the relative frequency based on the number of individuals where the code appears.

Table 10

Data Use Construct and Relative Frequency of Codes by Participant

Data use constructs	Number of coded interviews	% of interviews ($n = 6$)	Number of coded survey participants	% of survey comment participants ($n = 53$)
Data use constructs - Jimerson, 2016				
Data access				
Data access high	0	0%	2	4%
Data access low	6	100%	15	29%
Data use to inform teaching	5	83%	17	33%
Do not use data to inform teaching	0	0%	13	25%
Data culture				
Data culture (mod-high)	5	83%	8	15%
Data culture low (data concerns)	3	50%	21	40%
Data benefits	6	100%	3	6%
Data skill-efficacy				
Data skill-efficacy mod to high	1	17%	8	15%
Data skill-efficacy low	2	33%	8	15%
Emergent data use constructs				
Types of data use	6	100%	16	31%
Part-time faculty issues	4	67%	6	12%
Collaboration with other faculty	4	67%	4	8%
Desire training on the use of data	2	33%	7	13%

Culture of data use. The researcher used the first research questions to explore the culture of using data at the district and colleges. Data culture encompassed how the leadership modeled data use and how faculty perceived data being used for decisions. In the construct that referred to the overall data climate, scores for each item indicated agreement that there was a data-driven culture, and leaders used data to make informed decisions. Although the faculty seemed to have a high agreement that leadership used data for decisions (see Table 10), the comments in the survey did not show this agreement. Some faculty believed that data were used

to justify decisions already made rather than decisions made based on analyzing data (see Table 11). In the coding of the comments and interviews, data concerns overlapped with the construct of a data culture, so these concepts were discussed together.

Table 11

Data Culture Items

Data culture	Mean	Std. deviation
The leadership of the college use data to make informed decisions.	3.51	0.82
There is a data-driven culture in the college I teach.	3.41	0.90
The leadership of the district use data to make informed decisions.	3.35	0.81

Note. $N = 124$; Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Concerns about using data. The items about the use of data were negatively scaled, so disagreement with the items indicated that teachers did not have concerns about these items. The mean scores for the items with negative associations with data, such as punitive outcomes, unhealthy competition, or mistrust, were lower, indicating that most faculty surveyed did not think using data would bring these types of concerns. However, in the survey comments and interviews, faculty believed that data were not used properly, so data use might not have affected the faculty directly. Teachers questioned how administrators justified decisions with data (see Tables 12 to 14).

Table 12

Data Concern Items

Data concerns	Mean	Std. deviation
I am concerned I do not have enough training in using the data.	3.15	1.22
I worry that data will be used to shame or punish other departments in the college.	2.72	1.08
I am concerned that data use will increase unhealthy competition among faculty in the district.	2.68	1.05
I am concerned that data use will increase unhealthy competition among faculty in the college.	2.64	1.03
I do not trust the data that is used in reports at the college or district.	2.46	0.96

Note. $N = 104$. Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Table 13

Data Culture and Concern Text Summary

Data use construct	Definition	Clarification of the construct based on survey comments and interviews
Data culture	Leadership or the organization's culture supports and models the use of data for decision making (Jimerson, 2016)	Survey comments had criticism on leadership use, and interviews had a criticism of other faculty using data
Data concerns	Concern or worry regarding possible misuse or abuse of data (Jimerson, 2016)	Data culture comments that were coded as low overlapped with Data Concerns comments and were combined in this coding count

Table 14

Data Culture Percentages

Data use construct	% of interviews ($N = 6$)	% of survey participants ($N = 53$)
Data culture (mod-high)	83%	15%
Data culture low (data concerns)	50%	40%

The comments on data culture and concerns intersected with the construct of leadership. Faculty comments indicated that leaders might not use data or hide data that did not support their decisions. A faculty member commented in the survey, "While I think there is lip service to making data-driven decisions, all too often, I see that data is not used. Worse, I sometimes see data being crafted to lead to particular decisions" (Participant 10, Survey). Another faculty

member commented, “When research shows our pathway is incorrect or harmful to students or the institution, it is rarely displayed to faculty and the community” (Participant 5, Survey).

This perception of the misuse of data by leadership was also tied to resources. One faculty member commented, “I think that how data is interpreted can be manipulated and does not always benefit the student. I worry that data use is only important to the district when it makes them more money” (Participant 76, Survey). Some faculty members indicated that leaders in the organization used data to support changes they wanted instead of to understand needed changes:

The leadership at the college and district levels all profess to make data-driven decisions, but the evidence belies this, viz., no significant changes have taken place in planning or in executing college and district directions or approaches. Leaders decide what they want to do then find "data" to support their wishes, so the data is driven, not driving.

(Participant 6, Survey)

Faculty members also indicated that data might be used for unhealthy competition among departments or faculty members:

This isn't so much a concern but an observation. I have overheard numerous deans using the same sets of data to bolster claims they make about their departments. All of them used the data sets to explain why their divisions were the best on the campus. Each chose to focus on the aspect of the data that best suited his/her needs and ignored the rest. What this observation has shown me is that while the data is objective, the enrollment data creates competition. Data has been used in the past to bring negative attention to specific departments in college-wide meetings. Some enrollment/success reports have been incorrectly calculated. (Participant 53, Survey)

The comments about leadership's use of data indicated some faculty believed this issue was a source of concern. Faculty perceived that some leaders misused data, but most valued and saw the benefits in using data themselves.

Benefits of using data. Survey results indicated that faculty strongly agreed that using data was beneficial. The construct of data benefits had the most robust agreement at a mean composite score of 3.94. Each item within the construct showed a solid agreement for the benefits for all educators and students (see Tables 15 to 17). Aligned with the quantitative results from the survey items, the qualitative data from the survey interviews showed how faculty viewed the benefits of using data.

Table 15

Data Benefits Items

Data benefits	Mean	Std. deviation
Data use benefits educators and students.	4.18	0.80
Data use helps me make informed decisions.	3.97	0.89
Data use is about continuous improvement in the classroom.	3.91	0.98
Data use helps me make ethical decisions.	3.69	0.89

Note. $N = 113$. Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Faculty members expressed the importance of looking at data and patterns that challenged assumptions and created opportunities for learning and growing:

Often, we find data reinforce our perceptions of how things are going. However, more importantly, we can have patterns we believe to be true only to see that the data patterns are not consistent with those beliefs. It is important to see if our assumptions are being validated with data or not so that we may continue to grow. Data is a big part of my approach in being department chair and how I teach. (Participant 118, Survey)

Another faculty member expressed not fearing the use of data and pointed to the importance of using data with other faculty to improve:

If you fear data, you fear improvement. I would love to develop a Center for Teaching Excellence, where those who understand how to collect and use data can help or train other faculty to do the same to promote improved learning environments for our students.
(Participant 123, Survey)

Table 16

Data Benefits Text Comments Summary

Data use construct	Definition	Clarification of the construct based on survey comments and interviews
Data benefits	Ability to see value or application of using data. (Jimerson, 2016)	The analysis revealed faculty saw benefits in using data, but many did not feel they applied this in their practice. Faculty interviews also revealed that faculty see other faculty who do not use data to inform their teaching.

Table 17

Frequency by Participants

Relative frequency by participant	% of interviews (n = 6)	% of survey participants (n = 53)
Data benefits	100%	6%

In several interviews, a faculty member shared that some of their other coworkers did not see the benefits of using data to improve their teaching, which represented a challenge:

Let's like getting them (faculty) to want to look at data. That's step one. There's a big block on that. There are those who are very mistrustful. There's a researcher we work with, and some faculty were going off and saying how you can lie with data, and he said, you know what else you can lie with? Words. And I always think of that because people get so mistrustful. But you can also lie with your words. (Participant 1, Interviews)

Such faculty comments and interviews indicated that they saw the benefits of using data; however, these faculty members also believed that many other faculty members did not see benefits in using data due to fear or mistrust.

Efficacy in using data. Aligned closely to the scores of data benefits, faculty believed that they were efficacious in using data (see Tables 16 and 17). However, in the analysis of survey comments and interviews, faculty members shared that they were not as confident in acting on data or supporting others in using data. They mentioned that they would like more training (see Tables 18 to 20).

Table 18

Data Efficacy Items

Data efficacy	Mean	Std. deviation
I can formulate worthwhile questions to guide my data use.	3.64	0.94
I am comfortable collaborating around data with colleagues.	3.57	1.01
When I examine data reports, I am confident that my interpretations are accurate.	3.51	0.90
Once I analyze data and draw conclusions, I know what action steps to take next.	3.44	0.89
I am able to support others in learning how to effectively use data.	3.38	0.96
I can easily access and navigate the district data systems (data warehouse inFORM and MySite).	2.98	1.08

Note. $N = 108$. Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Table 19

Data Efficacy Text Comments Summary

Data use construct	Definition	Clarification of the construct based on survey comments and interviews
Data efficacy	Ability to access instructional data and navigate data systems (Jimerson, 2016)	Participants felt they could use data, but many felt they do not know how to access data to get data they need or need more training on data access and application.

Table 20

Percent of Data Efficacy

Data efficacy	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)
Data efficacy moderate to high	17%	15%
Data efficacy low	33%	15%

One survey participant commented, “I am confident in MY abilities to create worthwhile questions. But I do not feel capable of manipulating inform to generate answers to all of my questions” (Participant 113, Survey).

Access to data. Accessing data had the lowest composite average score at 1.85, which indicated most faculty did not access or use IR data or services at the IR office. Faculty rarely accessed the IR data systems or utilized the college or district research office (see Tables 21 to 23). Survey comments and interviews confirmed that most faculty did not access or know how to access IR data. However, many would like more training to access these data. In the interviews, three of the six faculty did not directly access IR data but worked with the college IR office to get the needed data.

Table 21

Data Access Items

Data access	Mean	Std. deviation
I have developed my reports with data I've collected.	2.30	1.34
I access the district's data warehouse (inFORM) reports.	2.25	1.27
I request data from the college or district research office.	1.96	1.09
I have developed reports with the college or district research office.	1.66	0.98
I have analyzed data with a research analyst at the college or district.	1.65	0.95
I have analyzed data with a data coach at the college.	1.31	0.72

Note. *N* = 124. Scale Values: 1 = *Never*, 2 = *Rarely*, 3 = *Occasionally*, 4 = *Frequently*, 5 = *Always*.

Table 22

Data Access Text Comments Summary

Data access construct	Definition	Clarification of the construct based on survey comments and interviews
Data access	Ability to access instructional data and navigate data systems (Jimerson, 2016)	Most said they do not access the IR data system directly.

Table 23

Data Access Percentages

Data access	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)
Data access high	0%	4%
Data access low	100%	29%

Survey comments included the following:

- “I don’t know how to access this data” (Participant 6, Survey).
- “I do not even know how to access the data warehouse, but I would if I did”
(Participant 11, Survey).
- “Time, easily accessible data, training, support, leadership from the college”
(Participant 13, Survey).
- “I can use it and do use some. I need more training and support. We need College leadership to help instruction use more data” (Participant 19, Survey).

Use of data. The use of data for teachers’ practices had a lower mean composite score of an agreement at 2.93, indicating that faculty were somewhat ambivalent about using data to inform their practices. The items in the use of data to inform a faculty’s teaching suggested that some faculty used data from colleagues to inform their teaching, and most did not use IR (see Tables 24 to 26). The faculty interviewed were split in whether they believed that they could use data for their teaching. All the full-time faculty interviewed thought that they had what they

needed to teach, but a few said they had to take workshops and training to understand how to read the data and figure out ways to apply the data to their practices:

What I keep learning is that pretty much all of your questions can be answered by data, and we can figure that out. You know, I didn't know how to do this before, but I feel like I'm learning more about what questions need to be asked. I don't know how to do the math around that and figure it out. But I'm learning more and asking, "Can you give me this data?" And that's where I feel like I've grown in my understanding.

Like how you know what data to look at to answer those questions. I think like, I've just been able to work so closely with researchers for the past seven years now. So, I'm now learning how it's easier for me to know this data will answer this question, but in the beginning, I had no clue. (Participant 4, Interviews)

Table 24

Data Use Items

Data use	Mean	Std. deviation
I use data from colleagues to inform my teaching and/or daily practice.	3.17	1.18
I use other data (not from the district's data warehouse (inFORM)) to inform my teaching and/or daily practice.	3.05	1.31
I use reports from our district's data warehouse (inFORM) to inform my teaching and/or daily practice.	2.58	1.25

Note. $N = 1,117$. Scale Values: 1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neither Agree Nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Table 25

Data Use Text Comments Summary

Data use construct	Definition	Clarification of the construct based on survey comments and interviews
Data use	Ability to see that the data are used to inform instruction (Jimerson, 2016)	Those interviewed talked about the data they used and how it informed their teaching. Survey comments were mixed with some faculty using data, and others do not understand how data are relevant to teaching.

Table 26

Data Use Percentages

Data use	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)
Data use high	83%	33%
Data use low	0%	25%

Yet, faculty who commented in the survey might not see a need to use data for their teaching. For example, a faculty commented, “Data has [*sic*] almost no place in my teaching. I am teaching beginning language to students. In the same way that I teach my granddaughter Spanish, data has no place in this type of teaching and learning” (Participant, 117, Survey).

Another faculty member stated the following:

I am so untrained in data. I majored in humanities and never even took stats. I find data overwhelming and not terribly helpful for what I view as my main job, to teach students, to help them learn, and to support them in their efforts to do so. (Participant 9, Survey)

Part-time faculty. The survey results and faculty interviews indicated a difference between full-time and part-time faculty regarding their experiences and perspectives about using data that warranted further exploration. An independent-samples *t*-test was conducted to compare the survey results by full- and part-time faculty responses. Three items were examined, as these

items exhibited significant differences. Table 27 provides the means for three items that were significantly different. Table 28 provides the *t*-test results.

Table 27

Full- and Part-Time Descriptives of Significant Different Items

Please choose which best represents your teaching position:	Full- or part-time	<i>N</i>	Mean	Std. deviation	Std. error mean
I access the district's data warehouse (inFORM) reports.	Full-time	44	2.91	1.24	0.19
	Part-time	27	1.63	1.08	0.21
I use reports from our district's data warehouse (inFORM) to inform my teaching and/or daily practice.	Full-time	44	3.00	1.32	0.20
	Part-time	27	2.37	1.15	0.22
I am concerned that data use will increase unhealthy competition among faculty in the district.	Full-time	44	3.00	1.12	0.17
	Part-time	27	2.48	0.80	0.15

Table 28

Full- and Part-Time Independent Samples T-Test

Independent samples <i>t</i> -test	Variances	<i>F</i>	Sig.	<i>t</i>	<i>df</i>	Sig. (2-tailed)	Mean difference	Std. error difference
I access the district's data warehouse (inFORM) reports.	Equal variances assumed	1.15	0.29	4.44	69	0.00	1.28	0.29
I use reports from our district's data warehouse (inFORM) to inform my teaching and/or daily practice.	Equal variances assumed	1.04	0.31	1.97	69	0.05	0.61	0.31
I am concerned that data use will increase unhealthy competition among faculty in the college.	Equal variances assumed	2.68	0.11	2.36	69	0.02	0.54	0.23

First, there was a significant difference between full- and part-time faculty accessing ($p = 0.00$) the IR data warehouse. More full-time faculty accessed the IR data warehouse ($M = 2.91$

and $SD = 1.24$) than part-time faculty ($M = 1.63$ and $SD = 1.08$) who rarely accessed the system or did not know it existed. Secondly, there was a significant difference between full- and part-time faculty using IR reports for teaching ($p = 0.05$); more full-time faculty agreed ($M = 3.00$ and $SD = 1.32$) that they used IR reports than part-time faculty ($M = 2.37$ and $SD = 1.15$). The difference might not be as large as for part-timers accessing the IR data warehouse because all faculty were emailed a report each semester; based on comments in the survey, many remained aware of this IR report. The difference in part- and full-time faculty points to the need to further explore access and use factors for part-time faculty.

Lastly, there was a significant difference between full- and part-time faculty regarding whether using data would increase competition among faculty ($p = 0.021$). Full-time faculty seemed to agree that using data would increase unhealthy competition ($M = 3.00$ and $SD = 1.12$). In contrast, part-time faculty disagreed that using data would increase unhealthy competition ($M = 2.48$ and $SD = 0.80$). The differences between full- and part-time faculty might be related to their roles in the colleges. In the survey comments, part-time faculty noted their involvement at the campus was limited. Participant 75 (Survey) stated, “As a part-time faculty, we do not have much [influence in] decisions on what courses to open or what content to offer in the courses, so we do not have a need to use this data, unfortunately.” Additionally, Participant 31 (Survey) stated, “As an adjunct, I don’t have visibility on-campus data culture.” These comments showed that part-time faculty might not be involved with data uses that could cause unhealthy competition.

Discussion

The faculty surveyed and interviewed reported that their environments had a culture of data use by leadership, and the faculty valued and understood the benefit of using data. This

finding was like that of Jimerson and McGhee's (2013) study in a small K-12 district in Texas. The researchers also found the teachers believed that data use was beneficial, and the school leaders supported using data. However, like Jimerson and McGhee's (2013) findings, faculties' comments and interviews showed a mix of positive and negatives feelings about the culture of leadership using data; many were skeptical about how data were used to make decisions. Many did not use or know how to use data for their teaching, saw the benefits of using data, and wanted training.

Additionally, access and use of the district's data system and IR offices were seldom used by most faculty, although more full-time than part-time faculty were aware of the data warehouse. Many faculty, especially part-time faculty, wanted more access and training. Survey comments and interviews also showed significant differences between part- and full-time faculty responses to several survey items. Further analysis of the qualitative data showed emergent themes related to the six data use constructs examined in the survey.

Emergent themes. Several themes in the qualitative analysis warrant further examination: (a) part-time issues with data use, (b) collaboration with other faculty, (c) communication and context of data use, and (d) desire for more training in using data. Questions about data use and the kinds of data faculty use were coded in the data. The rationale for soliciting this information was to examine possible enhancements to the data warehouse reports or develop potential interventions that would better support faculty using IR data.

Part-time faculty. In the findings section, part-time faculty responded significantly differently from full-time faculty on three questions regarding data access, use, and concerns (see Table 29). These results indicated that any training or intervention for an IR office to support data use should consider how part-time faculty differed from full-time faculty. Part-time issues,

such as having limited time on campus, little or no training with district systems, and limited communication, would impact part-time faculty using any intervention based on data. The part-time faculty expressed that they did not have training on using these data for their teaching but wished they had more training. Participant 6 (Survey) stated, “It can be difficult for adjunct faculty to get access to relevant school/district data.” Participant 3 (Interviews) stated, “I got no training on data resources. I actually elected to do workshops; it's been me signing up to get that. But when I came, there was nothing [in training] as a part-time teacher.” Furthermore, Participant 8 (Survey) commented, “I question the extent that most faculty know about and made use of data provided by the district. Workshops or video-on-demand tutorials might help. Adjuncts are especially out of the loop.”

Table 29

Part-Time Theme Text Summary

Construct	Definition	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)	Clarification of the construct based on survey comments and interviews
Part-time faculty issues	Data use related to part-time faculty	67%	12%	Issues that impact a part-time faculty to use data were around access, awareness about college issues, involvement in meetings.

Desire more training. An insight from axial coding occurred between awareness and training. Faculty were unaware of data available and wanted more training on accessing and using data for their teaching (see Table 30).

Table 30

Training Theme Text Summary

Construct	Definition	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)	Clarification of the construct based on survey comments and interviews
Desire for training	Faculty expressing a desire to have more training on access to data and how to use data for their teaching	33%	13%	This theme is related to data access, use, and efficacy.

Collaboration with faculty. In three of the six interviews, faculty were involved in larger scaled projects at the college that used data. For this reason, there were many references coded with faculty collaborations (see Table 31). The researcher did not use the survey instrument to test for faculty members' collaboration with other faculty in using data; however, researchers explored that construct (Jimerson & McGhee, 2013; Jimerson & Wayman, 2015; Jimerson, 2016).

Table 31

Faculty Collaboration Theme Text Summary

Construct	Definition	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)	Clarification of the construct based on survey comments and interviews
Collaboration with other faculty	Training for faculty on data use; initiatives on using data with other faculty <i>*This aspect is identified in the literature review but not explicit in the survey design.</i>	67%	8%	Full-time faculty (<i>N</i> = 3) were all involved in working with faculty on using data. They expressed frustration with not having more faculty wanting to collaborate with other faculty on using data.

Types of data for teaching. Throughout the survey comments and interviews, faculty noted the kinds of data they wanted to see or thought would be helpful to their teaching. The data

types included a student's previous academic history (e.g., prior courses taken or grade point averages), support services attended (e.g., tutoring services or counseling), and engagement on campus (e.g., interest outside of class). The data were varied; thus, further exploration into the categories is warranted to explore potential enhancements to the data warehouse and reports (see Table 32).

Table 32

Data Theme Text Summary

Construct	Definition	% of interviews (<i>N</i> = 6)	% of survey participants (<i>N</i> = 53)	Clarification of the construct based on survey comments and interviews
Types of data use	Specific kinds of data faculty wanted to use or understand about students	100%	31%	Types of data included student history (previous courses taken) if they attended tutoring, engagement data (online activity, clubs, or interest in college events), course evaluations, data linked to college-wide initiatives (elimination of remedial courses).

Limitations

There were several limitations to this needs assessment study, including the role of the researcher. First, participation was voluntary and was not a representative sample of the district faculty population. Additionally, the participants who completed the survey all seemed to like the notion of using data. Faculty who did not want or like using data might not be represented well. The faculty members interviewed all enjoyed using data, and some led projects using IR data at the colleges. Several faculty members who worked closely with other faculty shared experiences about others not trusting the data and would like to change this sentiment among these faculty. A few faculty members also worked with the college IR office, where members helped these teachers use data.

My position in the organization was a limitation and strength. In the context of a faculty's microsystem or culture, I might be considered an indigenous-outsider (see Banks, 2014). I am an indigenous-outsider because I have been socialized in the district's faculty culture over the last decade, but I am on the "outside" of the faculty group itself and part of the administration. However, as an administrator, I can be viewed as someone external to the faculty's culture. I remained mindful of my position in the organization. I worked closely with executive leadership (the chancellors and vice-chancellors), which could have influenced what the faculty shared in the interviews and comments.

Milner's (2007) discussion on unforeseen dangers was vital to consider and examine for the study's validity. My position in the organization allowed direct access to data on faculty. I had long-standing work relationships and friendships with faculty. I believed that these relationships enhanced my ability to understand many historical, cultural, and political aspects of faculty in the study's context. Both elements could make the analysis open to unintentional bias, and I employed member checking to validate my findings and conclusions (see Milner, 2007).

Conclusion

The needs assessment provided an opportunity to explore faculty beliefs and attitudes on data use in a community college setting to understand how members of an IR office could provide better data service to faculty. The survey instrument indicated strong agreement that using data was beneficial, and a good culture of data use existed in the organization. However, comments and interviews also revealed skepticism and negative experiences with how data were used among administrators and faculty.

Data access was tied to data use, as most faculty did not access the IR data warehouse, which had the lowest of the data construct mean scores. Most faculty believed that they could

use data for teaching, but many said they did not know how to apply data to their practices. An emergent qualitative theme related to access and use was that faculty wanted more training on using the IR data warehouse and applying such data to their teaching. The survey results indicated that faculty felt efficacious in using data. Still, a qualitative theme that emerged was that faculty did not feel confident in using data or supporting others to use data for their teaching practices. The interviewed faculty members also indicated more training and opportunities should be offered, so faculty would have chances to collaborate in using data for educational questions. Lastly, two emergent themes in the needs assessment study indicated that further research would be needed to understand part- and full-time differences and the relationship between data use and types. The next chapter contains discussions of data use constructs regarding access, use, efficacy, and collaboration to develop a data use intervention for faculty.

Chapter 3: Understanding Faculty Data Use

This researcher explored the literature to understand empirical research in educational data use to support the IR Office's faculty stakeholders. In the K-12 context, the most salient data use factors were in a teacher's access to data, efficacy in using data, and collaborative inquiry (Dunn et al., 2013a; Hora et al., 2014; Jimerson & McGhee, 2013). The research showed that these factors were not isolated, and teachers' experiences intersected with their confidence and concerns about using data in their practices. Initial research in the postsecondary context indicated that faculty might be comfortable using data for their disciplines but lacked experience in educational data analyses (Hora et al., 2014, 2017; Hora & Smolarek, 2018; Kerrigan & Jenkins, 2013). In the K-12 context, leadership in the organization is an essential factor for creating an environment conducive to data use, and peer leaders can influence teacher data use (Kallemeyn, 2014; Marsh & Farrell, 2015; Spillane, 2015; Spillane & Kim, 2012). An added element in the initial literature review is that peer collaboration around data use may build trust and lessen concerns in data use (Farley-Ripple & Buttram, 2015).

The needs assessment researcher of community college faculty data use explored the data constructs of access, attitudes, and anxiety in data use, data efficacy, collaboration, and data culture of faculty. Several key findings in the needs assessment were essential to consider when designing an intervention for faculty in the study context. First, most faculty noted that using education data was beneficial to their teaching, but they did not access the IR data warehouse. Many wanted to learn and participate in training on accessing and using the data. Second, faculty believed that they could use data for teaching, but many did not know how to apply data to their practices and wanted more training. Lastly, themes to explore further included faculty collaboration with data and understanding what kinds of data would make a difference in faculty

members' use of data. Although part-time faculty and their data needs were an emergent theme in the needs assessment, I chose to concentrate on full-time faculty for the scope of the intervention.

Conceptual Framework

A conceptual framework illustrates the community college context for faculty data use and the interactions between the IR office and faculty members (Figure 5).

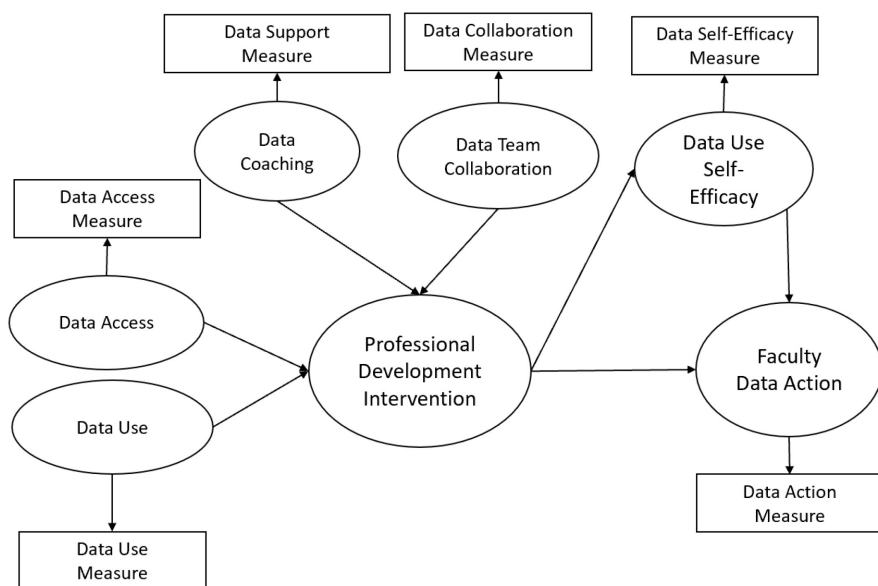


Figure 5. Conceptual framework measurement model for faculty data use intervention.

The factors outlined interacted and potentially impacted the relationship between faculty and the intervention. IR office members sought to understand the complicated interplay of context and underlying factors that influenced faculty members' motivations to use educational data. The literature review shows interventions that one can use to understand factors further in faculty data use to improve the IR office's services. The following section includes relevant empirical research to develop an intervention to enhance faculty members' data use to inform their teaching practices.

Faculty Professional Development

An underlying premise is that leaders instituting professional development will lead to teacher changes and improved student learning. Teacher changes require a long-term process of changing attitudes, beliefs, and perceptions that lead to improved practices in the classroom (Guskey, 2002). Professional development researchers of teachers focus on the K-12 environment. Although many principles apply, community college faculty in California have more freedom in their professional development and requirements choices. In this study, full-time faculty were expected to complete a target of 38 hours of professional development a year in the community college. These hours went beyond classroom instruction, as community college faculty might meet the professional development requirement by participating in learning activities that met state guidelines stipulated by faculty-negotiated agreements.

The complexity of professional development leading to teacher changes requires an interaction of factors for teachers to be motivated to learn, be active participants, feel connected, and have the time to try out the learning (Clarke & Hollingsworth, 2002). A complement to the professional development theories in the K-12 context is to consider a framework of adult learning theory. Researchers can use this theory to emphasize the alignment to the learner's motivation and engagement in the learning experience (Knowles, Holton, & Swanson, 2014).

The adult learning theory has six assumptions that differentiate the approach from a pedagogical model. The premises are that adult learners have (a) a need to know why the learning is essential for them, (b) responsibility for their learning decisions, (c) more significant levels of experience, (d) readiness to learn, (e) application to their life, and (f) motivation to understand what will help them in their lives (Knowles et al., 2014). Adult learning theory researchers provide essential aspects to consider when developing professional development for

faculty in community colleges. The faculty in the study had varied educational backgrounds, experiences, and training for using data. They also had diverse experiences and educational backgrounds in using data to influence their readiness, orientations, and motivations to participate in the professional development activity. One faculty member might feel well-versed in using data and have specific data and analyses that they would like to work on in the professional development activity.

In contrast, another faculty member might be unfamiliar with using and analyzing data for teaching. They might need support organizing and analyzing data. Faculty from different disciplines and experiences in using educational data should be considered in the intervention design and how the IR office could support the varied faculty population.

Adult learning theorists (Knowles et al., 2014) advocate a process model of being thoughtful of a learner's experiences, where a facilitator prepares resources together with the learner to guide the learning. Adult learners need to draw on their drive to learn and find how they can be integrated into their actions as teachers. Leaders of the intervention required a design that incorporated learners at diverse points in their learning and their need to find meaning (see Knowles et al., 2014). In building an intervention where faculty were not mandated nor required to participate and asked to volunteer their time for the intervention, they had to see the value in spending time discussing data. Adult learning theorists build learning through the learners' experiences, reflection, and dialogue, paying attention to learners' contexts (Rohlfing & Spelman, 2014). In reviewing interventions in the research, leaders of designs incorporating opportunities for exchange to encourage reflection and sharing of learners' experiences is another vital component explored in this chapter.

Data Literacy Versus Data Use

Researchers have used the term data literacy to examine specific components of using data to improve teaching and student learning. Data literacy is generally defined as an iterative process that includes (a) identification of a problem, question, or purpose; (b) ability to identify and access data to address the issue; (c) transformation of data into information or analyze data; (d) interpretation of the data; and (e) decision-making or action (Kippers, Poortman, Schildkamp, & Visscher, 2018; Mandinach & Gummer, 2016). The concept and principles of data literacy operationalize the definitions of data use, and these steps are studied and applied in the K-12 context. Researchers have conceptualized data literacy as an integral component of a teacher's skill set to improve teaching and student outcomes (Gummer & Mandinach, 2015; Mandinach & Jimerson, 2016). A significant portion of the interventions in the empirical study of K-12 data use are centered on a curriculum to teach data literacy principles (Bolhuis, Voogt, & Schildkamp, 2019; Cowie & Cooper, 2017; Ebbeler, Poortman, Schildkamp, & Pieters, 2016; Kippers et al., 2018; Reeves & Honig, 2015; Schildkamp & Poortman, 2015; Schildkamp, Poortman, Luyten, & Ebbeler, 2017; Van Geel, Keuning, Visscher, & Fox, 2017).

Many K-12 researchers in this chapter refer to data literacy (Gummer & Mandinach, 2015; Mandinach & Jimerson, 2016). Literacy is a complex process that can also imply that teachers are deficient in using data. In the context of community college faculty, the term literacy can hold negative connotations and be viewed as an evaluation of faculty members' skills. The needs assessment researcher did not examine the components of faculties' data literacy skills but explored how faculty approached using data.

Achieving The Dream (ATD) was the most extensive initiative and study, to date, on community college educators' data use to improve educational outcomes. ATD was designed to

encourage colleges to examine data and evidence of what worked to develop strategies to address achievement gaps but was not prescriptive about what or how data were used (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). There is little empirical research on postsecondary faculty data literacy, and more is needed in understanding how faculty think about and use data for their instructional practice (Hora et al., 2017).

The literature review contains researchers who explore the components of K-12 data use interventions that may include data literacy principles. I use the term data use instead of data literacy when describing the focus on the intervention design applied in a community college context. The following sections show an overview of the research related to data use concepts highlighted in the needs assessment: access and identification of data, data use, efficacy, and collaboration in data use. Applicability to the community college setting is highlighted within such data use concepts.

Data Use Attitudes and Efficacy

Teachers' capacities to act purposefully and constructively to direct their professional growth or teacher agency are essential in improving teaching abilities (Calvert, 2016). As discussed, faculty have freedom in choosing their professional development, so their motivation is crucial in a voluntary professional developmental intervention. Faculty who see value in using data related to their teaching and work (Knowles et al., 2014) may be more motivated to participate in a data intervention and more likely to stay engaged in an intervention that is not a requirement of their job than others. The following section includes research of some of the complexity of psychological factors of attitudes and self-efficacy in data use (Bolhuis et al., 2019; Dunn et al., 2013a; Dunn, Airola, Lo, & Garrison, 2013b; Prenger & Schildkamp, 2018).

Educators' attitudes, beliefs, and self-efficacy are essential factors in using data to make educational decisions (Jimerson & Wayman, 2015; Wayman, Wilkerson, Cho, Mandinach, & Supovitz, 2016). Over 1,700 K-12 teachers were surveyed to examine their data use self-efficacy and the relationship to use data for their instructional practices (Dunn et al., 2013b). The researchers created a DDDM Measure of Efficacy and Anxiety (3D-MEA) instrument based on Bandura's (1997) concept that teachers' efficacy influenced their goals, persistence levels, and motivations to teach. Exploratory factor analysis showed the following five-factor latent structure in the following areas of data efficacy: (a) data identification and access, (b) data technology use, (c) data analysis and interpretation, (e) data application to instruction, and (f) data anxiety. The researchers found that all five factors influenced teachers feeling efficacious about using data (Dunn et al., 2013b). The first four factors were positively related to a teacher's data efficacy. The last factor, anxiety, was negatively related, where if a teacher had less anxiety, they would likely feel they could use data. The interplay of access and training of the data systems and the use and application of data to teach were identified in the needs assessment findings. The study indicated confirmation that supporting these data use areas in an intervention study could increase faculty members' efficacy and use of data for their teaching practices.

Prenger and Schildkamp (2018) studied in the Netherlands and examined 300 primary school teachers' psychological factors, including attitude, intention, perceived control, collective efficacy, subjective norms, and the relationship to instructional data use. The results indicated a teacher's attitude, perceived control, and intention were positively related to the increased use of data for instruction (Prenger & Schildkamp, 2018). The researchers described teachers' attitudes in two ways. First, teachers needed to feel data use was important to others at the school, and then they must have a safe environment to use data to see data collection as enjoyable. Perceived

control for teachers meant using data and opportunities to discuss and share experiences with colleagues. The researchers found that if teachers felt less control, the less likely they would use data. In this study, teacher self-efficacy was not as strongly related to instructional data use. The researchers noted a ceiling effect, where a teacher's self-efficacy in data use was already high at the beginning of the study. The researchers hypothesized a teacher's high self-efficacy scores could explain the more minor impact on such teachers (Prenger & Schildkamp, 2018). The study showed an essential difference and connection between faculty members' attitudes and self-efficacy in using data. The aspects of perceived control for faculty to discuss data in a safe environment was essential for the intervention design.

Five-hundred-thirty-seven K-12 teachers participated in data use professional development that included collaborative activities using data (Dunn et al., 2013a). The importance of this study to the intervention was that professional development with leaders who focused on data access, use, and collaboration could increase faculty's data use self-efficacy. The researchers found teachers more confident in their ability to access and use data had higher data efficacy scores. Teachers with higher data efficacy were also more likely to collaborate with colleagues to use data to improve their teaching than others. The researchers posited that most data use professional development activities that teachers participated in included brief workshops or seminars. The researchers suggested that leaders of these short experiences did not provide time for iterative learning with practicing and reflecting on using data (Dunn et al., 2013a). The researchers suggested that leaders of data use professional development needed to move beyond the "one-shot" seminar paradigm to see changes in teachers' anxieties and increase data efficacy (Dunn et al., 2013a).

ADT researchers explored factors in community college faculty using data and examined which factors showed correlations to increased data use (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). The researchers found that perceived usefulness of student data related to more use of student data; if a department used data, faculty in those departments used data more. The researchers also found a weak correlation if faculty believed that student data did not relate to their jobs, or if they did not trust the college's data, they were less frequent users of data (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013).

Leaders should embed professional development to improve effectiveness in using data regarding the faculty context and experiences, as sustained through iterative cycles (Darling-Hammond, Hylar, & Gardner, 2017). Leaders of the intervention may need an extended time to develop faculty data efficacy fully. The intervention study's scope was a short-term intervention to identify areas that could grow into future professional development embedded in the institution. The areas of faculty accessing data, using data, and collaborating with data are examined in the following sections to tackle these aspects of increasing faculty members' self-efficacy for data use.

Access to Data Systems

The needs assessment researcher found that most faculty participants did not access available educational data or IR services. A strong theme in the survey comments was that faculty would like more training to access data. "I question the extent that most faculty know about and made use of data provided by the district. Workshops, or video-on-demand tutorials might help. Adjuncts are especially out of the loop" (Participant 8, Survey). Examining studies on implementing data systems could provide insights into improving faculties' access and use of

data for their teaching practices. This section contains a discussion of interventions with leaders improving teachers' access to data.

In the early 2000s, leaders of data warehouses, presentation tools, and analytic software systems for teachers to collect and analyze data promised to increase systemwide reflection and school improvement (Wayman, 2005). Dunn et al. (2013a) found that K-12 teachers' abilities to access data and navigate technology systems improved their self-efficacy for using data. In a comparative case study of three large K-12 school districts in Texas, chosen for their data use efforts, some researchers considered experiences implementing data systems (Cho & Wayman, 2015). The researchers found that district leaders experienced both successes and challenges, and success depended on how they approached the system's implementation (Cho & Wayman, 2015). The district leader who considered historical context, organizational bureaucracy, and users' input and training seemed to avoid pitfalls. In comparison, district leadership who drove an implementation without institutional support had more implementation difficulties (Cho & Wayman, 2015). The researchers emphasized that considerations on users' context and training across the district were needed to sustain the system's implementation and remained critical for better adopting the technology (Cho & Wayman, 2015).

In a large public university study in 2015, researchers interviewed six faculty and 21 advisors about a newly implemented LA tool (Klein et al., 2019). The researchers found that the participants initially tried to use the tool, but most did not continue to use it for their teaching or advising (Klein et al., 2019). The faculty expressed that the tool was a burden to their workloads. They noted if leadership took a collaborative perspective, they would have been more likely to buy in to use the tool (Klein et al., 2019). The researchers found that organizational barriers rendered an unsuccessful implementation of the LA tool; a lack of institutional commitment and

inadequate training and communication impacted the system's use (Klein et al., 2019). Another aspect in studying the use of data systems entailed issues with ethics of using student data (Klein et al., 2019). In the analytics study, the faculty felt unsure if they should look at students' prior grades and had concerns about not knowing the limits of their positions related to using available data about their students. The faculty also noted confusion about institutional policies and a need for better communication on guidelines concerning using LA tools.

Some researchers conducted a case study at the University of Michigan and explored how faculty experienced an educational data science program designed for faculty to be practitioner-researchers in learning communities (McCoy & Shih, 2016). The program leaders provided access to student data to address educational questions related to educators' classes or departments. The researchers examined educators as active producers of the data analysis rather than only consumers of data. Leaders of this year-long program provided participants with access to data visualization software that could connect to institutional student data sets in the university's data warehouse or data from the learning management system. The research questions examined what factors motivated faculty to participate, what types of barriers and challenges faculty encountered, and what kinds of supports could be provided for future programs. The researchers interviewed 11 participants who represented the various projects, tenure and non-track faculty, university staff, and doctoral students.

The researchers found that participants were motivated to use student data to answer questions related to their educational environments. Even with the available assessment data, such as grade performances or course evaluations, they could not adequately answer their questions (McCoy & Shih, 2016). The researchers highlighted that participants were propelled to participate in the program because of the "prospect of improving their educational environment

and teaching through a systematic study of their students, the classroom, and the broader learning environment” (McCoy & Shih, 2016, p. 202). Although these participants were motivated, the researchers found that such participants ran into data access barriers, use, and interpretation.

Many participants believed that the data systems were complicated to navigate. Participants were provided an overview session, yet they remained unsure of what was available to them and how to retrieve such data, so many projects stalled. Participants expressed difficulty communicating their data needs and navigating data sets. The researchers noted that multiple communication breakdowns occurred when asking for the data participants needed, and it took a lot of time to clarify the project's data needs. One participant stated that it felt like such leaders spoke a different language when asking for data sets, and several back-and-forth communications occurred to get the needed data (McCoy & Shih, 2016). The researchers found that participants had varying skills, and program leaders did not provide adequate training on using the data visualization tool to analyze the data. Some participants had to learn how to use the tool independently or hire experienced graduate students. When asked what barriers they faced in the project, participants stated that they would have valued more formal training in what data were available in the data systems and how to use the visualization tool (McCoy & Shih, 2016). When participants had frequent communications with the administrative support staff, they seemed to have more success in completing projects.

Lastly, the researchers found that learning communities with participants across various academic disciplines and backgrounds was also a support for the program. The participants noted that the program meetings provided an avenue through which the participants could share their experiences throughout their projects. The participant community enabled participants to hear

about the experiences of those in the other projects and learn from their peers in other disciplines (McCoy & Shih, 2016).

McCoy and Shih (2016) highlighted that the data use program leaders considered the educators as developers of their data and not just consumers. This philosophy aligned with the adult learning theory of the importance of the co-creation of learning between the facilitator and learner (Knowles et al., 2014). The program's goal was to provide educators with data, support, and tools to do their analysis. Although the educators were motivated, they still faced barriers in data access and use. The amount of data available in complex data systems could be overwhelming. The researchers recommended more training to provide data to faculty, explain the data, and show how those data could be applied to answer educational data questions. Administrative support and peer collaboration were also crucial to participants' motivations and success in educational research projects (McCoy & Shih, 2016).

The needs assessment researcher indicated that some faculty knew about the district's data system but needed support to access and navigate critical data. Adult learning theorists stress that teachers should incorporate a learner's experience, context, and active engagement for enhanced learning experiences (Knowles et al., 2014). The studies on implementing data systems and analytics tools show that leaders implementing an innovation should consider institutional factors, such as leadership support, user's context for training, communication, and policies related to training on using the tools and ethics about data use (Cho & Wayman, 2015; Klein et al., 2019).

Leaders who implement analytical tools in higher education environments provide vital insights to providing more access to data. Although researchers intended to provide more data to faculty to use (Klein et al., 2019; McCoy & Shih, 2016), barriers in accessing data for educators

existed. The obstacles included the need for more training of the tools, understanding how to ask for data, and continual communication and administrative support. Creating a learning community for participants was valued support when implementing a data system or data program.

The community college district leaders had a functioning data warehouse going through technology modernizations and upgrades. Enhancing the data warehouse with analytic tools or data programs is a potential avenue to create an intervention to increase access and data use for faculty. However, the tool or data system leaders should consider adult learning principles that center on making such data accessible and valuable for faculty. The following section contains a review of literature about essential factors in using data for educational problems.

Data for Faculty's Needs

The needs assessment researcher identified an emergent theme related to the types of data faculty needed for their teaching or educational questions. The faculty expressed that the data they had access to did not support the kinds of questions they had about their students. Examples provided in the findings included that faculty wanted more historical information on their students for better understandings of where they could target their lessons or student engagement data on programs and educational interests in the college to provide additional resources based on student interests.

In the LA study, some researchers found that participants were motivated to use student data to answer questions about improving their institutions (McCoy & Shih, 2016). The participants used the traditional assessment tools of grades and course evaluations to inform their teaching practices. Participants were interested in the project because it could improve their educational environments and lead to more student success (McCoy & Shih, 2016). An essential

consideration in the intervention design entailed creating activities based on faculty members' data inquiries to motivate them to seek out data and use those data. This section contains a review of studies in the K-12 context where researchers applied a data use intervention for teachers to show pertinent findings based on a community college context.

Some researchers of a year-long study of 245 cases of middle school teachers' data use in the United States used a qualitative comparative case study design to understand the combinations of conditions associated with instructional responses to data (Farrell & Marsh, 2016a). The researchers found no changes to a teacher's instruction when considering externally produced data, such as state test scores. The researchers concluded that the data needed to be more closely related to teachers' contexts and teaching to remain meaningful to teachers (Farrell & Marsh, 2016a). A similar study with primary school teachers in the teacher education college in the Netherlands showed that data use increased when data were relevant to a teacher's instruction. Data use decreased when data were not as applicable for a teacher's instruction, such as accountability data (Bolhuis et al., 2019). Both studies showed that using data disconnected from a teacher's practice might make a teacher less motivated to participate in a data use intervention. The intervention design leader should connect faculty to topics with relevance and impact on their work, educational questions, or passions (Knowles et al., 2014). Other studies showed similar conclusions, where data less connected to the teacher and not as relevant to their classroom were less likely to be used (Ebbeler et al., 2016; Schildkamp & Kuiper, 2010).

In studies with K-12 teachers in Illinois and Massachusetts, teachers reported the top data use behaviors were to (a) determine students' level of achievement, (b) identify next steps for instruction, and (c) modify instruction or lesson plans for current students. These studies indicated that if data were used to help teachers with students in their classes, they were more

likely to use such data (Reeves, 2017; Reeves, Summers, & Grove, 2016). Some other researchers conducted a large Midwestern university study to examine 64 primary teachers who completed a 6-hour data literacy course before their first teaching years (Reeves & Honig, 2015). The researchers found moderate gains in the preservice teachers' self-efficacy with using data and increases in beliefs that conducting assessments using data was valid and valuable for teaching practices (Reeves & Honig, 2015). The researchers also found that teachers described the most valuable aspects of the data literacy course entailed using the data tool, acquiring peer feedback, and working with someone to analyze such data. The researchers also discussed participants' comments that they would have preferred to work with peers in the same subject area as working with other teachers from the same instructional content area. The intervention was open to faculty from various disciplines. These researchers emphasized that data closer to the teacher's context might better influence faculty members' use of data.

Achieving the Dream (ADT) researchers explored faculty using data and examined which factors showed correlations to increased data use (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). The researchers found that faculty who used data more frequently in departmental decisions or met more regularly to talk about data with their departments used data more than others. The researchers also examined academic program areas and found that faculty in general education were less likely to use data. Those in for-credit occupational programs were more likely to use more data than those in other programs. Developmental faculty members used data more than those in other programs on student achievement data (Jenkins & Kerrigan, 2008; Kerrigan & Jenkins, 2013). Although the researchers found correlations in the data, they cautioned that the data were not generalizable because they only surveyed ADT colleges.

Studies on data use in the K-12 are conducted in more uniform environments where teachers are of the same grade level or teaching the same or similar course materials (Jimerson & Childs, 2017; Mandinach & Jimerson, 2016; Wayman & Jimerson, 2014). The challenge in creating a similar intervention in the community college context is that faculty will be from various disciplines and teaching an array of curriculum. The K-12 intervention studies showed that the data should remain relevant and close to the teacher to encourage using such data. Research in ADT colleges showed insights into possible differences in data use by academic programs and if the department leaders frequently discussed data.

The researcher should identify faculty members' educational research questions and what data were available and applicable for the faculty to analyze. Designing the intervention to solicit and incorporate faculty members' educational research questions would isolate meaningful data to faculty rather than using accountability data that could be too far removed from the faculty's context. Soliciting faculty's data needs might also be enhanced in a group setting where faculty could hear and learn from other faculty. The following section contains an exploration of how a data collaboration can enhance using data.

Data Collaboration and Support

Professional development leaders who include collaboration can effectively enact changes (Darling-Hammond et al., 2017). Collaborative professional development approaches can consist of one-on-one, small-group, or school-wide collaborations. These types of professional development seem to promote school changes that extend beyond individual classrooms (Darling-Hammond et al., 2017). Adult learning theorists also support using reflective activities or collaborative dialogues to enhance complex changes sought by learning

experiences (Rohlwing & Spelman, 2014). Empirical studies on data teams' collaboration and the inclusion of support from data specialists or peer data coaches are examined in this section.

Data teams. Researchers have defined a data team as a team of teachers and leaders who work collaboratively to use data to solve an educational problem within the school (Schildkamp & Poortman, 2015). Researchers in the Netherlands and Sweden examined data teams in secondary schools to understand the characteristics of the group that influenced using data (Schildkamp & Poortman, 2015; Schildkamp, Smit, & Blossing, 2019). A well-functioning data team's essential component fell into two categories: data characteristics and team characteristics (Schildkamp & Poortman, 2015). Data characteristics included having access to high-quality and relevant data from multiple sources (Schildkamp & Poortman, 2015). Both countries' studies showed that solid data team characteristics included (a) support from a data expert, (b) support of leadership, (c) a shared goal, and (d) regular participation (Schildkamp & Poortman, 2015; Schildkamp, Smit, et al., 2019). These studies showed components that should be considered in the design of a data team intervention. Additional analyses showed what aspects of teachers' data use could influence data team interventions.

Modeling after the Bolhuis et al. (2019) study in the Netherlands, some researchers conducted a similar study at a Texas elementary school (Jimerson, Garry, Poortman, & Schildkamp, 2020). However, the researchers focused on policy and practices that hindered or enabled the use of data. The researchers organized their results into two categories: team factors and leadership factors (Jimerson et al., 2020). The researchers found that if the team showed a collective commitment to using data, it supported the data team model. Hindrances to the team included (a) a lack of time, (b) a lack of continuity and sustained focus on the project, (c) limited data use capacity, and (d) a rush to action without enough reflection on the data (Jimerson et al.,

2020). Some key considerations for developing an intervention during a worldwide pandemic entailed faculty time and capacity to focus on data activities.

Researchers found two primary types of support in a collaborative faculty-driven analytics program that aided the completion of participants' projects (McCoy & Shih, 2016). First, the office and staff's support to provide access to the institutional student data contributed to completing the assignments. The support staff provided regular communication and assistance to the faculty, which helped the faculty feel more successful in the program. The second support highlighted was the program's community of faculty, staff, and graduate students from various academic disciplines. The researchers found that although the participants had different analytical skill levels, the program's meeting leaders provided opportunities for participants to hear about techniques others used in their projects and share their experiences. The researchers noted that these discussions served as motivators for participants inexperienced in data analytics (McCoy & Shih, 2016).

The studies on data teams in the Netherlands, Sweden, and Texas showed critical elements in designing effective data teams (Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). In creating the intervention, the data team should access high-quality and relevant data from multiple sources, understand the goals, participate regularly, and include support from a data expert. In a postsecondary data analytics program, researchers noted that administrative support and a collaborative design seemed to increase the completion of projects (Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). The data expert and administrative support are further explored in the literature and can fall under the role of a data coach. The following subsection additionally contains an exploration of this role to support faculty members using data.

Data coaching. Professional development that includes mediation improves the quality of learning. External facilitation, such as the collaboration of other teachers, researchers, and networking, is more likely for teachers to self-reflect on their knowledge and enact changes (Avalos, 2011). Experts who guide educators' professional development or facilitators who support group discussion and collaborative analysis can support another effective professional development element (Darling-Hammond et al., 2017). Teachers who receive coaching are more likely to enact desired teaching practices and apply these practices more appropriately than those receiving more traditional professional development (Darling-Hammond et al., 2017). Coaching can be a critical addition to effective learning and building knowledge, particularly in collaborative groups (Swan Dagen & Bean, 2014).

A data coach refers to someone who supports using data and data literacy principles. Such a coach can be a teacher leader, instructional coach, or an external expert, commonly a part of a data team (Bolhuis, Schildkamp, & Voogt, 2016a, 2016b; Huguet, Marsh, & Farrell, 2014; Marsh, Bertrand, & Huguet, 2015). Data coaches or experts who understand data literacy principles can be external to data teams (Moore, Smith, Schultz-Jones, & Marino, 2019). The literature showed data coaches as critical parts of data teams (Bolhuis et al., 2016a, 2016b; Huguet et al., 2014; Marsh et al., 2015).

Data coaches can play essential roles in mediating teachers' responses to data and were associated with teachers' use of data to alter their instructional deliveries (Farrell & Marsh, 2016a; Huguet et al., 2014; Marsh et al., 2015). At a teacher education college in the Netherlands, five teachers participated in a professional development data team intervention. The researchers studied the participants' experiences in the data team, examining the data coach and teacher learning levels based on Kirkpatrick's evaluation model (as cited in Bolhuis et al.,

2016b). Overall, the participants had positive experiences in the data team. Learning seemed to occur in the data team's conversations, and the data coach played an essential role in supporting the data team (Bolhuis et al., 2016b). The data coach's role was two-fold: (a) as an expert in obtaining and understanding the data and (b) as a coach to facilitate discussion on the hypothesis of the group's questions to maintain focus on the data and depth of inquiry. The participants noted the importance of the data coach being on the team, balancing being an expert, and coaching the group's conversation (Bolhuis et al., 2016b).

In a year-long qualitative study, six low-performing middle schools' leaders in four districts had data literacy coaches as part of their data team. The findings showed data teams and coaches supporting more significant teacher pedagogical changes (Huguet et al., 2014; Marsh et al., 2015). This study indicated essential aspects of the data coach to consider developing a data use intervention for faculty. The researchers used *a priori* constructs to examine how teachers described their experiences with the data coach and data team that influenced their instructional practice changes (Huguet et al., 2014; Marsh et al., 2015). The researchers found that dialogue between all the teachers and the data coach was an important factor in using the data to alter instruction. A data coach's interpersonal skills can influence team dynamics and teachers' experiences. One example the researchers noted was that a data coach had difficulty working with the teachers and dominated the conversation rather than facilitating the discussion. The data coach's lack of facilitation and dominant personality hindered discussions and co-construction of knowledge among the team's teachers (Huguet et al., 2014; Marsh et al., 2015). This study indicated essential considerations for designing a data team intervention, choosing data coaches, and studying relationships between data coaches and team members.

Data teams and change. Some researchers of a year-long study at a teacher education college in the Netherlands examined five participants on a data team intervention and how it influenced teachers' data use, attitudes, and efficacy in using data (Bolhuis et al., 2019). The researchers found that teachers participating in a data team increased their use of data for school improvement. However, the researchers had mixed results when examining how the data intervention impacted teachers' attitudes and self-efficacy for using data; some teachers improved some areas, and others decreased. The researchers discussed differences that could have been attributed to teachers' attitudes and skill levels coming into the intervention. A few teachers felt optimistic about their ability to use data, but they realized their skills were not as high as they initially thought after the intervention. A few other teachers were confident that the data would answer the questions they sought to answer. Still, after using the data and not finding results to act upon, they were less optimistic about using data (Bolhuis et al., 2019). Consideration for the faculty intervention was that faculty would come into the intervention with different attitudes and skill levels regarding data use. The study results showed a challenge from measuring changes from a data use intervention.

Summary of Intervention Literature

Empirical research on how educators use data to answer and find solutions for their educational questions has primarily been conducted in the K-12 context. Less studied are interventions on data use in the higher education environment and the impact on faculty and their teaching. Insights in the K-12 environment showed key aspects in building a data use intervention for faculty that could be applied in an educational environment where less structure existed regarding curriculum, assessment, and professional development. The needs assessment showed that most faculty believed that using data was beneficial to educational decision-making,

and the organization's culture overall was supportive of using data. Faculty participating in the study felt efficacious in using data; however, they could not access and use educational data easily, preferring opportunities for more learning and collaboration around using data than currently provided.

New data tools could represent an avenue to providing better access for faculty to use data. However, studies on the implementation of data systems and LA tools showed that more was needed to support accessing and understanding data and new tools (McCoy & Shih, 2016). Elements in the organization's culture need to be considered when using a new technology tool (Wayman et al., 2012). These elements include leadership's commitment to using the tool; faculty's workload, understanding, and communication about the types of data and analysis; and initial and ongoing training and support to use the tool. For an intervention leader who uses technology systems, the data and tools should remain accessible, and leaders should consider training and support for faculty's skills levels (McCoy & Shih, 2016).

The key to using data entails understanding the questions faculty want to answer and motivating them to seek those data (Knowles et al., 2014). An essential consideration in the intervention design entails creating activities of the faculty's data use experience and educational problems that they want to understand better to find solutions (Darling-Hammond et al., 2017). Data unconnected to a teacher's practice may make a teacher less motivated to participate in a data use intervention (Bolhuis et al., 2019; Ebbeler et al., 2016; Farrell & Marsh, 2016a; Schildkamp & Kuiper, 2010). The researcher needs to connect the faculty to topics relevant to their work, educational questions, or passions (Knowles et al., 2014).

Teachers also need to incorporate the learner's experience, time for reflection, and collaborative dialogue (Rohlwing & Spelman, 2014). Joint professional development with data

teams and coaches is an effective method for a data use intervention (Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). Empirical research considers the essential elements that make the team more effective: access to high-quality data, support from a data expert, and modeling by leaders (Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). Data coaches also play critical roles in collaborative learning by accessing data, understanding the data, and facilitating discussions about understanding and using the data for action (Bolhuis et al., 2016a, 2016b; Huguet et al., 2014; Marsh et al., 2015).

Intervention Design

The intervention design was grounded in adult learning principles (Knowles et al., 2014), focusing on effective professional development (Darling-Hammond et al., 2017; Guskey, 2014; Rohlwing & Spelman, 2014) on faculty members' data needs in a community college context. In creating a more optimal learning experience, the intervention leader focused on activities to connect data to faculty interests, consider their experiences using educational data, and plan and collaborate with faculty on learning objectives.

Adult learning principles include the importance of planning with the learner to ensure learning is connected to the targeted audience (Knowles et al., 2014). When developing the intervention, faculty members who led faculty development were consulted to explore the kinds of data and topics that interested them. Personalized faculty dashboards, challenges in understanding data, and student majors and pathways were suggested as topics. These topics and data sets were used as part of the intervention curriculum and activities. The learning experience design included interactive activities and sense-making activities (Darling-Hammond et al., 2017; Guskey, 2014). Both short presentations provided the necessary knowledge on accessing

and using educational data in the data warehouse. Time was provided for discussion and exploration of the data.

A collaborative data team with data coaches was incorporated into the intervention design to support faculty (see Bolhuis et al., 2016b; Bolhuis et al., 2019; Jimerson et al., 2020; Schildkamp, Smit, et al., 2019). Data coaches from the IR office were included to support access and understanding of data (see Bolhuis et al., 2016a, 2016b; Marsh et al., 2015). The data coaches would know what data could be accessed to incorporate these data into tools to address educational questions. The intervention was designed so that the data coaches also facilitated discussions with faculty and remained available to meet one-on-one or in smaller groups to support faculty data needs.

The intervention was initially planned to be conducted in person. Due to the COVID-19 pandemic, the intervention was conducted online. The IR office staff sought a faculty leader and instructional designer's expertise at one of the colleges to develop an online professional development course. Moving to a fully online workshop was challenging, as the IR office staff had never conducted training online before. The intervention staff initially intended to use an online learning management system. In the recruitment period, faculty expressed that they did not have the time to log into an online system. The instructional designer recommended focusing on synchronous online meetings rather than using a learning management system. The intervention design was restructured to recorded online sessions.

Conclusion

The needs assessment researcher found that faculty saw the benefits and felt somewhat efficacious in using data, but many wanted to learn more about accessing and using educational data provided by the IR office. The intervention was designed to provide an overview of the IR

data warehouse and inform about educational data available to faculty. The studies in the literature showed important aspects to consider when working with faculty and educational data. For example, training and communication in accessing and understanding the data and data tools are important components in building faculty's efficacy in using data (McCoy & Shih, 2016). The intervention design included data coaches from the IR office to identify and explain data and training on data tools.

Another finding in the needs assessment was that faculty wanted to learn how to use data for their teaching. Addressing data use and the components of data literacy is a complex learning experience (Kippers et al., 2018; Mandinach & Gummer, 2016). The intervention staff targeted two specific aspects of faculty data use. First, the learning should remain meaningful and driven by the faculty member's motivation to use data. The intervention staff provided opportunities for faculty to ask their educational questions that the IR office staff could address. The second aspect of data use in the intervention design entailed supporting faculty members with a collaborative approach, such as using a data team (see Schildkamp, Smit, et al., 2019).

The IR office staff provided a workshop series. This series included an overview of training of the district's data system and tools. The team created a collaborative experience targeted at faculty members' educational questions. The intervention goal was to develop positive data use experiences that would impact faculty members' data efficacy for their teaching practices.

Chapter 4: Faculty Data Use Collaborative

In response to the needs assessment, the Faculty Data Use Collaborative (FDUC) intervention was designed for community college faculty to increase access, understanding, and use of educational data for their teaching practices. The intervention leader built on an existing data system available to faculty at the district's two colleges. The intervention design was informed by researchers focused on faculty members' motivations and data use self-efficacy (Farrell & Marsh, 2016a, 2016b; Reeves & Chiang, 2018), abilities to access and use data (Cho & Wayman, 2015; Klein et al., 2019; McCoy & Shih, 2016), and effective data use collaboratives (Bolhuis et al., 2019; Jimerson et al., 2020; Schildkamp, Poortman, et al., 2019).

Purpose of Study

The purpose of this study was to understand how faculty experienced a data use collaborative and its impact on crucial data use conceptual factors identified in the needs assessment and literature review. The FDUC was a newly created workshop series with individual-level data coaching offered by the IR office. The FDUC was provided over two months, including four synchronous online sessions, an optional synchronous session, and individual meetings between the faculty and data coaches. The workshops were designed to fit data topics of interest to faculty, training, and exploration into existing and new data tools. The research questions in this study included the following:

RQ1: What was the level of faculty engagement and satisfaction in the intervention?

RQ2: To what extent did the intervention change faculty's access and support to use data?

RQ3: What is the effect on faculty data use attitude and self-efficacy in using data after participating in this intervention?

RQ4: To what extent did the intervention change faculty’s data use collaboration after participation in the intervention?

Research Design

The following sections show the FDUC intervention research design based on three areas: (a) application of a theory of treatment, (b) the process evaluation designed to monitor implementation fidelity, and (c) the outcome evaluation. A theory of treatment was used to examine an intervention, participants, and the components in the process to understand better the relationship to an expected outcome (see Leviton & Lipsey, 2007). In this study, the outcome desired was to understand better how community college faculty used educational data for their teaching practices. Figure 6 diagrams the relationship between the proposed intervention activities and intended proximal outcomes.

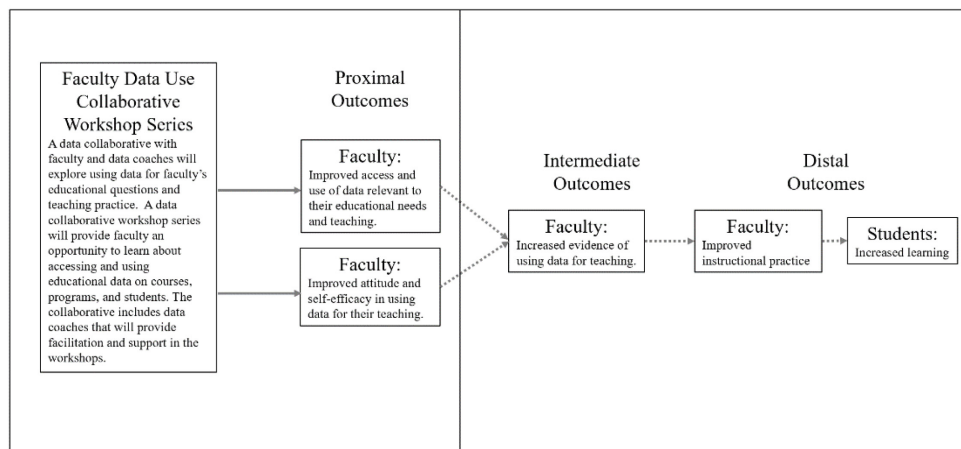


Figure 6. Theory of treatment.

The intervention hypothesis was that the FDUC intervention provided learning through collaborative workshops to improve faculty members’ access, use, attitude, and self-efficacy in using data for their teaching. The intermediate and distal outcomes of the intervention’s impact on a faculty’s practice and student learning are discussed in the literature as the ultimate aims of using data. However, given the timeframe of the planned intervention and research questions,

longer-term outcomes were not within the scope of this study. The researcher focused on the proximal outcomes of how a collaborative data use workshop series included learning about faculty data questions and needs and how providing data support could impact faculty members' data use self-efficacy for their teaching practices.

Figure 7 shows a logic model for the FDUC intervention of the treatment, inputs, activities, and intended outputs in a theory of treatment. The logic model also indicates an understanding of the context, participants, activities, materials, and intervention processes.

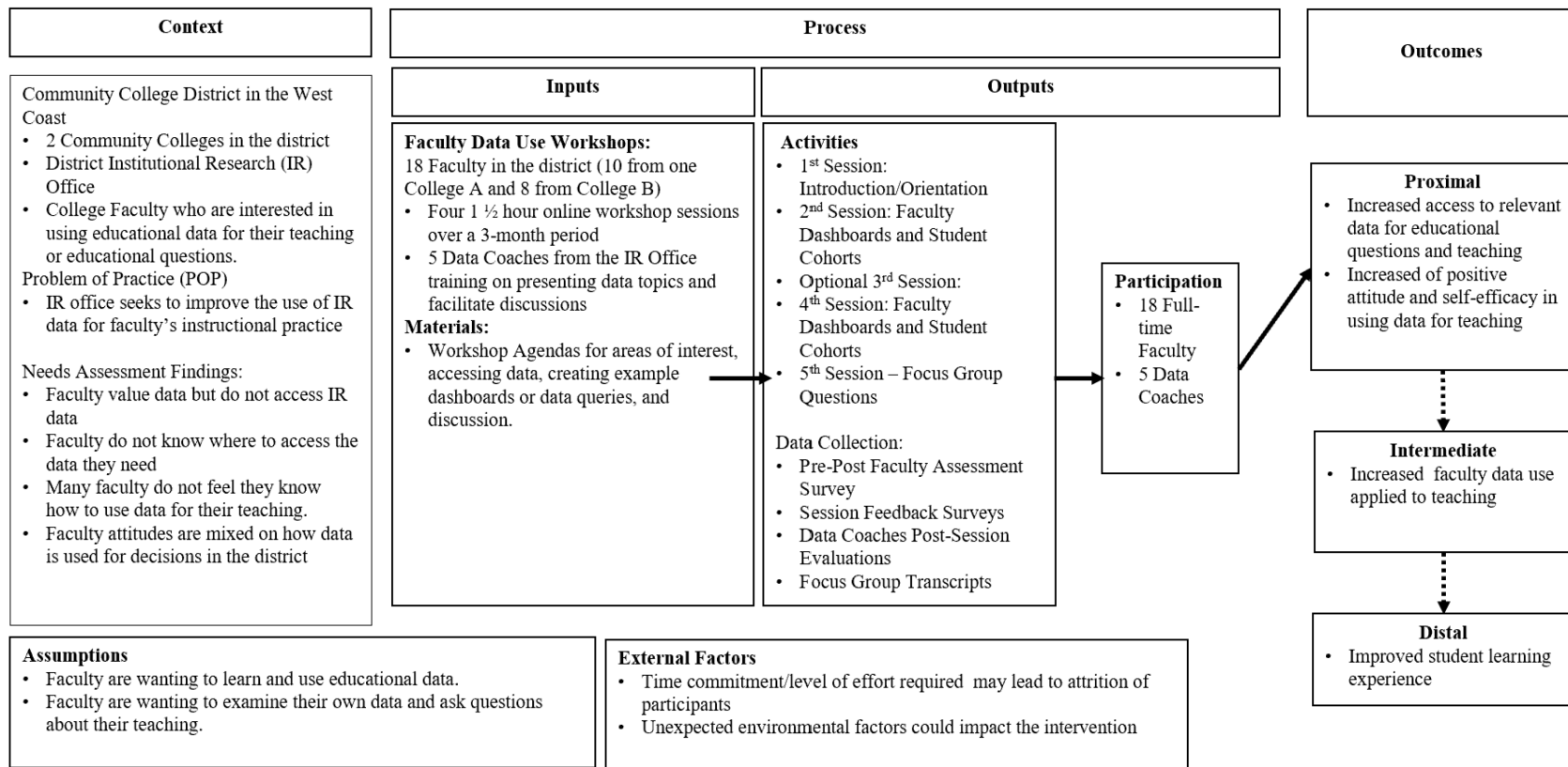


Figure 7. Logic model.

The intervention hypothesis was that the FDUC intervention would provide learning through collaborative workshops to improve faculty members' access, use, attitude, and self-efficacy in using data for their teaching. The intervention was designed using a convergent parallel mixed-methods design. The researcher collected quantitative and qualitative data for the process and outcome evaluations described in the following sections.

Process evaluation. A researcher can use a process evaluation framework to assess the intervention's implementation, how participants have received the treatment, and the fidelity of planned activities (Dusenbury, Brannigan, Falco, & Hansen, 2003). The researcher used the process evaluation plan to identify and prevent defects in the planned intervention while monitoring the implementation based on feedback (Stufflebeam, 2003). This formative assessment was critical in adjusting activities and approaches during the intervention for an improved intervention that aligned with the goals of this study (see Zhang et al., 2011). The researcher used a process evaluation centered on two areas of intervention fidelity (see Rossi, Lipsey, & Henry, 2019). First, the program's implementation was evaluated for consistency with the planned activities and goals of the intervention. Secondly, participant engagement and satisfaction were assessed after each session. The following subsections include the methods and instruments used for the process evaluation.

Implementation of faculty data use collaborative. The FDUC intervention's planned workshop sessions were compared to planned activities and implemented activities. As part of this formative evaluation, the researcher and data coaches watched the video recordings of each session. The IR team discussed how the faculty received the presentations, discussions, and activities for each session. They also reviewed how much of the intended goals of each session were accomplished.

Participant engagement and satisfaction. Participant engagement was defined by the extent to which the faculty were involved in the intervention's activities and content (see Dusenbury et al., 2003). The researcher and data coaches collected faculty attendance logs and took notes on faculty member's participation during each session. An online session feedback form was provided to participants after each session (see Appendix B). The researcher used the feedback form to ask faculty to rate their interest levels in the session's topics and the usefulness of the session. The form also contained two open-ended questions for faculty to comment on useful aspects of the session and areas for improvement. The feedback forms were reviewed a few days after collection and before the next session. The feedback contained valuable formative assessments and indicated areas to adjust or change. The researcher and data coaches also gained valuable insights from assessing faculty members' experiences and preferences.

Outcome evaluation. Understanding how data are used for teaching decisions in postsecondary institutions is a complex problem, and empirical research about how using data impacts a faculty's teaching practice is minimal (Hora, 2012; Hora et al., 2017; Hora & Smolarek, 2018; Kerrigan, 2015). The outcome evaluation design was a one-group pretest-posttest. The pretest was taken before the intervention and the posttest at the end of the last session. The differences between the pretest and posttest outcomes were examined. A focus group interview of the participants in the final session of the intervention was transcribed and coded to provide qualitative data on the faculty's data use constructs after the intervention. The examination of two different but complementary data sets helped the researcher understand how the FDUC impacted faculty members' data access, support, use, attitude, and efficacy constructs to create a fuller picture of the intervention outcomes.

Method

The following sections show the study's methodology. The methodology includes discussions of the participants, instrumentation and intervention procedures, data collection, and data analysis. Five data use constructs defined as key in the literature and relevant to the needs assessment findings are defined and explained in the measures and instrumentation section.

Participants. The study population included all full-time faculty with access to the IR data warehouse at the community college district on the West Coast. In Fall 2020, there were 385 full-time faculty teaching in the district. The gender percentage of faculty in the district was approximately 54% female and 46% male.

A nonprobabilistic and purposeful sample was used to select faculty for the intervention (see Creswell & Plano Clark, 2018). The participants were chosen from full-time faculty in the district who expressed interest in the FDUC. Four IR staff and the researcher served as data coaches in the intervention to support small-group collaborative activities. The maximum number of participants desired in the study was no more than 30 full-time faculty to maintain a 6:1 ratio of participants to data coaches.

The researcher embedded the recruitment process for the FDUC in the Faculty Data Use Survey sent to all full-time faculty on September 4, 2020. The survey was open for two weeks and remained voluntary. Seventy-three full-time faculty members responded to the survey—a 21% response rate. The researcher presented a question in the survey to ask faculty if they would be interested in participating in the FDUC as part of a study. Forty-one faculty indicated an interest in the FDUC. During the recruitment period of the study, the faculty had transitioned to fully online instruction due to the COVID-19 pandemic. Many faculty members communicated that increased workloads, family commitments, and schedule uncertainties made it challenging to

enroll in the workshop; for example, 18 of the 41 interested faculty committed to participating in the FDUC.

The 18 faculty members represented an almost even distribution between the two campuses: 11 identified as females (56%) and seven as males (44%), the average years teaching at the colleges was 14 years, and 13 faculty (73%) had been or were department chairs at the time of the study. The faculty represented various disciplines that included anthropology, biological sciences, business, chemistry, communication studies, counseling, dance, economics, English, environmental studies, library services, mathematics, psychology, sociology, and theatre arts.

Measures and instrumentation. Quantitative and qualitative data were collected with several instruments: (a) pretest and posttest Faculty Data Use Survey, (b) postsession semi-structured focus group interview with participants, (c) postsession semi-structured focus group interview with the data coaches, and (d) researcher and data coaches' attendance logs and observation notes kept after each FDUC sessions. The following subsection shows the quantitative and qualitative instruments and measures.

Quantitative instrument. The Teacher Data Use Survey (Wayman et al., 2016) was developed in the K-12 context to understand educators' data orientation, data access, literacy, data supports, and data use in their practice. An adapted version of the Teacher Data Use Survey (Wayman et al., 2016) was developed and named the Faculty Data Use Survey. The data collected from the survey informed a one-group pretest-posttest design given to a group of participants for a treatment (Shadish, Cook, & Campbell, 2002). The adapted survey used a 5-point Likert scale and included demographic information, question sets related to five data use

constructs, and open-ended items (see Appendix F). Table 33 shows the five data use constructs, definitions, and references.

Table 33

Data Use Constructs

Data use construct	Construct definition	Instrument
Access	Faculty's ability to access and identify data needed in district systems	Pre/Post Survey Section A – 5 Items
Support	Faculty's experience with support provided to use data (training, professional development, data coach/specialist)	Pre/Post Survey Section B – 6 Items
Attitude	Faculty's attitude toward using and applying data for their teaching	Pre/Post Survey Section C – 5 Items
Data efficacy	Faculty's assessment of their ability (self-efficacy) to use data to inform teaching	Pre/Post Survey Section D – 7 Items
Collaboration	Faculty's experience in using data in groups or teams for a specified purpose	Pre/Post Survey Section E – 10 items

The Teacher Data Use Survey data use constructs had a Cronbach's alpha statistic of 0.85 or higher (Wayman et al., 2016, p. 21). A Cronbach's alpha was conducted to check the validity of items within each Faculty Data Use Survey construct. The three data use constructs of attitude, data use self-efficacy, and collaboration had Cronbach's alpha statistics of 0.90 or higher. The data use constructs of access and support had Cronbach's alpha scores of 0.77 and 0.84. The following subsection shows each data use construct, its relationship to the literature reviewed, and the importance of the concept to the intervention research design.

Access. The data access construct was used to measure how the faculty felt about their access to the district's data systems to obtain information about their students or educational questions. The following items were included in the data access construct: (a) I have the proper access to technology to efficiently examine data, (b) the inFORM data warehouse reports provide me access to lots of data, (c) the inFORM data warehouse reports are easy to use, (d) the inFORM data warehouse reports allow me to examine various types of data at once (e.g., enrollment, success, demographics), and (e) the inFORM data warehouse reports generates

displays (e.g., reports graphs, tables) useful to me. The researcher used questions related to the access construct to unpack various aspects of data access found in other intervention studies (see Cho & Wayman, 2015; Jimerson & Wayman, 2015; McCoy & Shih, 2016). The first three questions related to accessing technology and navigating the data system. The last two questions were used to ask faculty if the data they accessed in the system were useful.

Support. The literature review showed professional development as an avenue to increase data literacy for educators and highlighted data collaborations, such as data teams (Bolhuis et al., 2016a; Ebbeler et al., 2016; Schildkamp, Poortman, et al., 2019) and data coaches (Bolhuis et al., 2016b; Marsh et al., 2015). The data support construct contained the following items in the survey: (a) I am adequately supported in the effective use of data on my students and classes, (b) I am adequately prepared to use data about my students and classes, (c) there is someone who answers my questions about using data on my students and classes, (d) there is someone who helps me change my practice (e.g., my teaching) based on data, (e) my district provides enough professional development in data use, and (f) my district's professional development is useful for learning about data use.

Attitudes toward data use. Teachers' positive attitudes in using data to make educational decisions were essential yet complex components in studying data use (Bolhuis et al., 2016a, 2019; Jimerson & McGhee, 2013). Teachers' experiences, educations, and training may influence their attitudes toward using data for their teaching (Jimerson, 2016; Jimerson & Wayman, 2015; Wayman & Jimerson, 2014). The attitude construct included the following items: (a) Using data on my students and classes helps me plan my instruction, (b) using data offers me information about students that were not already known, (c) using data helps me know how students are doing in my class, (e) using data helps me identify how to help students learn

better, and (f) using data helps my students do better in my classes. The needs assessment researcher found that most faculty felt optimistic about using education data, although many expressed that they did not know how to use data for their teaching practices.

Data efficacy. The data efficacy construct was used to measure faculty members' self-reported abilities to use and analyze data for their teaching practices (see Dunn et al., 2013a, 2013b; Prenger & Schildkamp, 2018; Wayman et al., 2016). The following items were included in the knowledge construct: (a) I am good at using data to diagnose student learning needs, (b) I am good at formulating questions about my students and teaching where I can find data to answer for my teaching, (c) I am good at collecting data to answer my questions about student learning and my teaching, (d) I am good at using data to plan my lessons, (e) I am good at using statistics to analyze data about questions about my students, (f) I am good at interpreting data from reports, charts, or graphs and drawing conclusions, and (g) I am good at adjusting instruction based on data. The data use self-efficacy construct was complex, like the attitude construct, where faculty members' experiences or training might also be related to how they would assess their analytical skills and applications of data.

Collaboration. The data collaboration construct refers to examining, discussing, or using data in a group of peers and data coaches in a collaborative environment. Data teams in the literature focused on collaborative professional development centered around a purpose or goal (Jimerson et al., 2020; Schildkamp & Poortman, 2015; Schildkamp, Poortman, et al., 2019). Survey participants were asked if they participated in a collaborative group when using data. If they selected "yes," they were directed to a series of items to rate the frequency of the collaboration. The scale of once a year, several times a year, monthly or weekly, or never was used to measure the data collaboration construct items. The items in the collaborative data

construct included the following: (a) We approach an issue by looking at data, (b) we discuss our preconceived beliefs about an issue, (c) we identify questions that we will seek to answer using data, (d) we explore data by looking for patterns and trends, (e) we draw conclusions based on data, (f) we identify additional data to offer a clearer picture of the issue, (g) we use data to make links between instruction and student outcomes, (h) when we consider changes in practice, we predict possible student outcomes, (i) we revisit predictions made in previous meetings, and (j) we identify actionable solutions based on our conclusions.

The five data use constructs are analyzed in the next chapter based on descriptive and inferential statistics. The constructs are further explored in a priori and thematic coding of the qualitative data.

Qualitative instruments. Several data collection instruments were used in gathering qualitative data for the outcome evaluation. First, the posttest Faculty Data Use Survey was administered to the faculty and included open-ended comments for each data use construct. Secondly, at the last FDUC session, a focus group interview using a semi-structured protocol was conducted to gather more data on identified data use constructs and faculty members' experiences in the workshops (see Appendix H). Third, the researcher and data coaches took notes of observations after each workshop session, which were gathered. Lastly, after the FDUC, a semi-structured focus group was conducted with those data coaches.

Procedure. The following subsection contains details on the FDUC workshop series, mixed-methods data collected, and the process of data analysis to evaluate intervention outcomes. During the intervention, process evaluation information collected for formative assessments included the attendance of participants, usage of the data systems, session feedback surveys, data coaches notes and observations, and researcher logs.

Intervention. The Faculty Data Use Collaborative (FDUC) was designed to create a learning experience to motivate faculty to ask questions about accessing and using data needed for their teaching practices. There were four objectives for the topics presented at the FDUC workshops. These objectives are discussed in this subsection.

The first objective of the workshops was a better understanding of whether faculty perceived that they had access to data needed for questions about their instructional practices or students. The IR data system accessible to faculty contained numerous data reports, but the needs assessment findings showed that most faculty did not regularly access this system. The workshops offered an overview and review of reports in the IR data warehouse. Activities showed what the teachers found complex or thought could be improved in the data provided.

The second objective of the workshops emerged from the intervention literature review and the importance of providing data relevant to faculty members' teaching practices (see Bolhuis et al., 2019; Ebbeler et al., 2016; Reeves & Chiang, 2018). Prototypes of individual faculty dashboards containing data from each participant's teaching history were developed for the intervention. Dashboards related to each participant contained a historical review of data from their courses (grade distribution, course fill rates, and demographics on students in their classes). Additionally, presentations on student majors' data were given at the workshops because several faculty members shared this act would be helpful for the program planning in the needs assessment.

The third objective of the workshops was aimed to identify other data interests that motivated faculty. Faculty were asked to provide questions and topics of interest for the workshop sessions to include. Requests for data that tracked specific student cohorts emerged from the faculty. The student cohorts were first-generation college students, students with goals

to transfer to 4-year universities, and students in honors programs. Lastly, the workshop leader aimed to provide a space for faculty to collaborate with a data coach and other faculty to explore how this collaboration could improve using data.

The intervention was conducted in the fall semester over six weeks between October 19, 2021, to November 16, 2021. Due to COVID-19, leaders of the district and colleges held all classes and services online, and the workshop sessions had to be designed as synchronous zoom sessions. Four synchronous only FDUC workshops were offered, and an optional session was offered after the first two sessions. The workshop leaders encouraged participants to work in collaborative sessions with the IR data coaches and other faculty.

Data coaches' preparation. Data coaches from the IR office assisted faculty in workshops by facilitating discussions, sharing their expertise in data definitions, and adjusting or creating reports to answer educational questions. Based on the workshop being new for the IR office, the IR staff served as data coaches, met with the researcher, and participated in training based on workshop objectives. The data coaches seemed proficient in accessing and identifying data in the systems while developing reports and dashboards using education data. However, they did not regularly facilitate faculty group discussions or observe faculty.

The researcher discussed workshop materials, guidelines in facilitating small group activities, and the goals of the intervention. The researcher asked the data coaches to take notes from each session on their observations of faculty engagement and take-aways from activities and discussion. After each workshop session, the researcher met with the coaches to debrief about the FDUC session and adjust if needed.

Data collection. Data from the pretest-posttest Faculty Data Use Survey were collected before the first session and after the last session of the workshop. Workshop session feedback

surveys were also collected after each of the four sessions. At the final workshop session, a focus group interview was conducted. Table 34 lists each instrument, method of analysis, and timeline.

Table 34

Mixed-Methods Data Collection and Timeline

Data collection type	Timeline
Faculty data use survey	September and December 2020
Workshop attendance	After each FDUC session
Report usage statistics	Post-FDUC
Session feedback forms	After each FDUC session
Faculty workshop observations	After each FDUC session
Faculty focus group	November 2020
Data coaches focus group	December 2020

A researcher of a convergent parallel design independently and concurrently collects quantitative and qualitative data to mix the various data sources and compare results (Creswell & Plano Clark, 2018). The parallel design fit the study's pragmatic intentions, where the researcher collected both sets of data throughout the intervention. The mixed-methods data were collected in several different formats explained in previous sections. Figure 8 illustrates the convergent parallel design of the FDUC and outlines the research questions, data collection, type of data analysis applied in each strand, and convergence of data analysis.

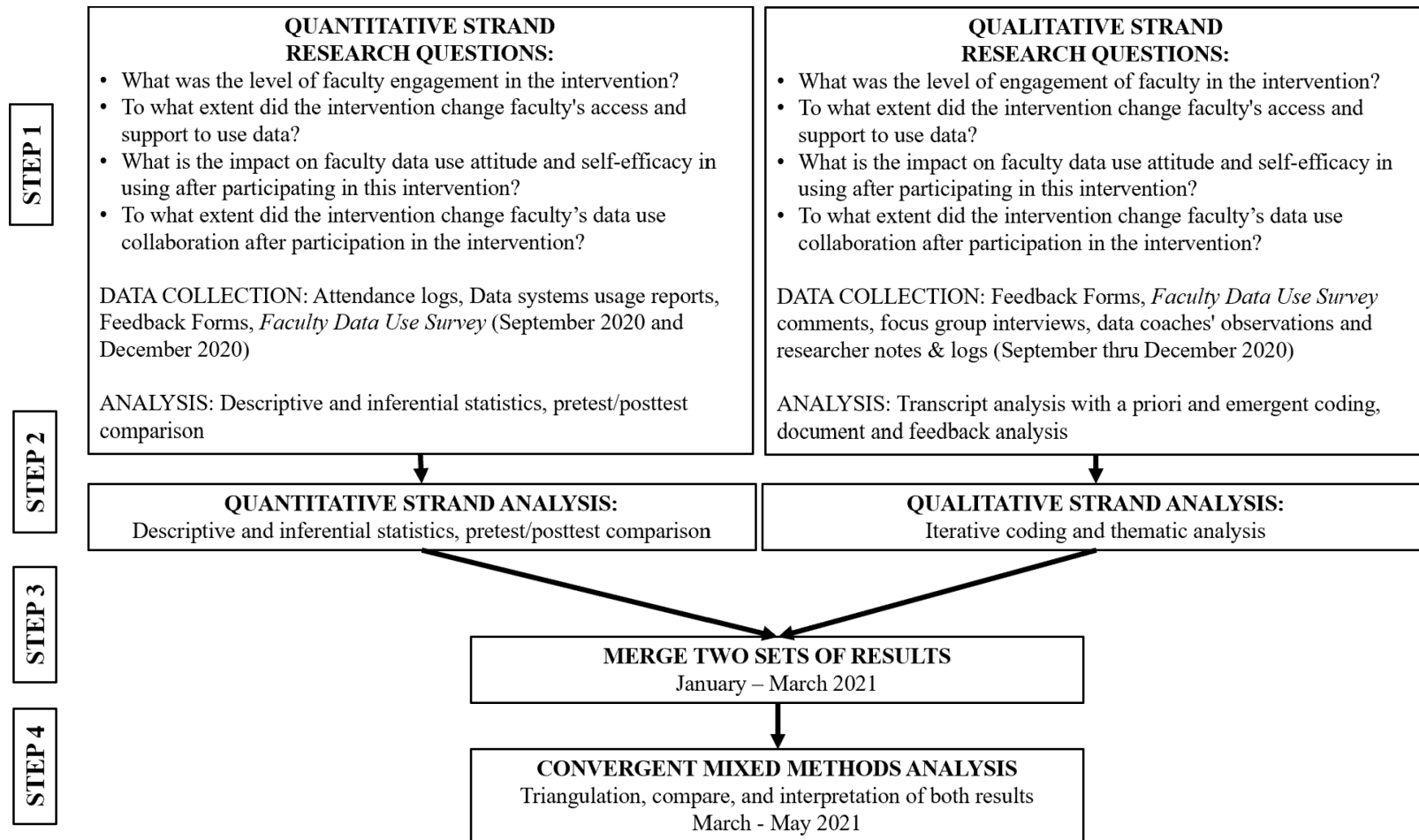


Figure 8. Convergent parallel mixed-methods research design.

Data analysis. A convergent mixed-method approach (Creswell & Plano Clark, 2018) was used to provide a comprehensive framework to explore quantitative and qualitative data collected in the survey, a focus group, and observation logs. The convergent mixed-method design was used in the process evaluation. Participant attendance logs, feedback forms, and observations were used to inform the intervention's implementation fidelity and participants' engagement and satisfaction.

Session feedback surveys (a process evaluation measure) were reviewed after each session to monitor progress toward session goals and adjust future training sessions. Faculty members' pretest-posttest data scores from the FDU survey were analyzed using descriptive and inferential statistical tests. This analysis was conducted before the qualitative analysis. The quantitative data were used in the a priori coding of the qualitative data. The focus group interview was recorded and transcribed. Both FDU survey comments and focus group transcript were first coded using a priori codes drawn from the five data use constructs. Several coding iterations were conducted using sub-coding of a priori codes (see Saldaña, 2013). The researcher used the qualitative data analysis software NVivo (see QSR International, 2018). After the first few rounds of coding, a thematic analysis was conducted to examine relationships between codes and possible axial codes (see Saldaña, 2013).

Convergence of data sets. Both data sets were analyzed and combined in the interpretation of results. The constructs identified in the quantitative analysis survey instrument were compared to the themes from the a priori and emergent coding during the qualitative analysis. The qualitative data showed a deeper view into participants' perspectives or "emic" viewpoint to illuminate a richer, more detailed understanding of the five a priori data use constructs (see Johnson & Onwuegbuzie, 2004). The data sets were further analyzed to

triangulate the results for a more in-depth understanding of the research questions (see Creswell & Plano Clark, 2018). Data coaches who participated in the workshops reviewed the quantitative data and coding to triangulate findings and relationships between the datasets (see Creswell & Plano Clark, 2018; Johnson & Onwuegbuzie, 2004). Appendix E contains the Research Summary Matrix.

Conclusion

The FDUC intervention was designed to address findings in the needs assessment of community college faculty to increase data access, understanding, and use of education data for their teaching practice. The intervention design was informed by research focused on faculty's motivation and data efficacy (Farrell & Marsh, 2016a, 2016b; Reeves & Chiang, 2018), the ability to access and use data (Cho & Wayman, 2015; Klein et al., 2019; McCoy & Shih, 2016), and effective data use collaboratives (Bolhuis et al., 2019; Jimerson et al., 2020; Schildkamp, Poortman, et al., 2019). The workshop series included an overview and training on the district's data system and tools.

The chapter provided an overview of the goals of the FDUC intervention using a logic model that showed the procedures of the intervention and intended proximal outcomes. The research questions were used to guide decisions using a convergent parallel mixed-method design to collect quantitative and qualitative data. The adapted pretest-posttest Faculty Data Use Surveys were used to collect faculty members' perceptions of data use factors for the quantitative analyses of the intervention. Session feedback forms, attendance logs, and session observations were used to inform the process evaluation. Data from the survey comments and post-intervention focus group transcripts were used for the qualitative data analyses. The quantitative and qualitative analyses were combined as part of the convergent parallel mixed-method design.

The next chapter includes the study's findings, implications to practice, limitations, and future research suggestions.

Chapter 5: Findings and Discussion

The goal of this dissertation was to explore how the IR office could better support faculty members' use of educational data for teaching and learning. The Faculty Data Use Collaborative's (FDUC) intervention study goals were two-fold. The goals included (a) examining faculty's data barriers and supports related to the IR data warehouse and (b) exploring the effect of a collaborative learning workshop series on faculty members' attitudes and self-efficacy toward using data. This chapter provides a short explanation of the context of community college faculty professional development, a description of the FDUC intervention process, and findings for each research question.

Community College Professional Development Context

Providing some context for community college faculty members' professional development can aid in understanding the intervention's approach. There was an expectation in the district's faculty contract that full-time faculty should complete professional development hours related to their disciplines and teaching practices each academic year. Faculty, for the most part, could choose necessary learning activities to fulfill their requirements. There was no required training on the district's IR data warehouse for faculty. Some faculty might have had opportunities to learn or use the IR data systems because they used the system as department chairs or college committees. However, the IR office did not offer regular training or ongoing professional development on their data warehouse for faculty. The FDUC workshop series was a new and voluntary professional development for faculty.

Implementation of FDUC

The intervention was designed to target two specific aspects of faculty data use. First, teachers need meaningful learning driven by the faculty members' motivations to use data

(Knowles et al., 2014). Secondly, one could use a collaborative approach to build faculty members' data efficacy (see Schildkamp, Smit, et al., 2019). The intentional design of the workshop was to create spaces for faculty to dialog with one another and provide someone who could support accessing and understanding the educational data. The intervention aimed to provide an experience where faculty could learn about the reports and data accessible in the data warehouse and explore their own educational data questions in a collaborative and supportive environment.

An additional aspect of the intervention was the preparation of the data coaches by the researcher. The data coaches were staff in the institutional research office. The IR staff worked extensively with educational data and the reports in the data warehouse. The four data coaches included two research analysts, one computer programmer, and one database administrator. Although the IR staff understood a lot about educational data in the warehouse, most had not worked with faculty members. The researcher conducted training sessions that focused on the staff's role in presenting and explaining data tools and facilitating discussions in the workshops. Table 35 shows the meetings conducted with the data coaches to prepare and debrief for each workshop session.

Table 35

Data Coaches' Schedule for Faculty Data Use Collaborative Preparation

Data coaches meetings	Time	Hrs.	Activity
September 17, 2020	10 to 11:30 am	1.5	Orientation or research project, workshop goals, and role as a data coach
September 24, 2020	1 to 2 pm	1	Review Faculty Dashboard Prototypes and Majors Data
September 28, 2020	10 to 11 am	1	Faculty Participants and Workshop agendas
October 15, 2020	10 to 11 am	1	Prepare activities for workshop #1
October 20, 2020	11 to 12 am	1	Debrief and follow-up for workshop #2
October 27, 2020	11 to 12 am	1	Debrief of workshop #2 and follow-up items
October 29, 2020	10 to 11 am	1	Development of faculty dashboard items and student cohort data
November 4, 2020	2 to 4 pm	2	Reviewed first two sessions and discussion of workshops plans
November 13, 2020	3 to 4 pm	1	Debrief of workshop #3 and follow-up for workshop #4
November 18, 2020	3 to 4 pm	1	Debrief of workshop #4
November 25, 2020	10 to 11 am	1	Follow-up on faculty dashboard items and plans for spring 2021
Total		12.5	

The workshops were initially planned to be in-person so that faculty could log into the data warehouse and work individually with data coaches in a computer lab setting. However, due to the COVID pandemic, the workshops were altered to be conducted online. The study encountered a few scheduling challenges and the effects of the pandemic.

The researcher started with 41 faculty indicating they would be interested in participating in the workshops in the survey. The researcher used a purposeful sample of motivated faculty who desired to participate and learn more about using data. The faculty were emailed information on the workshop asked to confirm their participation in the workshops. Sixteen faculty members emailed that they could not participate because their workloads were too heavy or conflicted with the meeting dates. Five faculty members responded that they would not make all the workshops, and seven did not respond. Several faculty members were concerned about the level of work the workshops would entail. After multiple communications with the faculty

regarding the time commitment and workload of the workshop series, 18 of the 41 faculty members interested in the workshops confirmed that they could participate in the workshops.

The 18 faculty members represented both campuses, with 11 females (56%) and seven males (44%). The average years teaching at the colleges was 14 years, and 13 faculty (73%) had been or were department chairs at the time of the study. The faculty represented various disciplines: anthropology, biological sciences, business, chemistry, communication studies, counseling, dance, economics, English, environmental studies, library services, mathematics, psychology, sociology, and theatre arts. Although the faculty covered a breadth of disciplines and years of teaching in the district, the small sample size was not representative of the district's faculty population.

The FDUC consisted of four synchronous online workshops, one optional synchronous session, and individual meetings with faculty who chose specific data topics over two months. The FDUC workshop series met four times during October and November 2020. Before starting the synchronous workshop sessions, faculty members were asked to provide information on topics of interest. Three participants provided topics of first-generation college students, data to improve academic programs, and data on students' progress toward student transfer goals.

The first workshop session provided a tour of the data warehouse reports, a prototype of an individualized faculty dashboard, a project on student majors, and the faculty's option to develop an individualized project with the data coaches. At this meeting, faculty members who indicated they wanted to work on individual projects were grouped with a data coach.

The second workshop session focused on two topics: (a) community college students' majors and (b) a prototype of an individualized faculty dashboard using the participants' historical data on classes taught. The intervention's schedule allotted time for faculty members'

questions about the data and for faculty to provide feedback on improvements to the dashboard. There was a two-week break between the second and third sessions. The researcher offered an optional open workshop session to faculty to work on any data question or projects with the data coaches. Four faculty members attended the optional session and asked questions about the dashboard and specific data topics. The data coaches also met with faculty members on identified educational data topics of interest.

The third workshop session brought back information on several faculty members' interests in capturing data for student cohorts that included first-generation, honors, and transfer students. The data coaches shared adjustments and future work on the individual faculty members' and students' major dashboards. The final workshop session recapped the topics and data discussions covered in the previous three workshops. The researcher conducted the postsession focus group at this session. Table 36 shows the timeline for the FDUC intervention study. Appendix I includes the workshop presentations.

Table 36

Faculty Data Use Collaborative Workshop Timeline and Agendas

Date	Activity	Duration	Agenda topic
September 4, 2020	Faculty Data Use Survey: Request for volunteers		Review volunteers
September 18-30, 2020	Selection of FDUC participants		Email volunteers
Preparation for Workshops	Researcher and data coaches: Prepare training and data around faculty questions.		Requests for faculty for questions they hope data will help them answer in the workshop.
Session 1: October 19, 2020	FDUC Workshop 1	1 ½ hr.	Introduction & workshop overview: •tour of data warehouse reports •data projects and design teams
Session 2: October 26, 2020	FDUC Workshop 2	1 ½ hr.	Workshop agenda: •student majors •data projects and design teams
Optional Session: November 2, 2020	Individual time for faculty to discuss questions	1 ½ hr.	Individual faculty questions
Session 3: November 9, 2020	FDUC Workshop 3	1 ½ hr.	Workshop agenda: •update on faculty dashboard data •data projects on student cohorts and transfer study
Session 4: November 16, 2020	Workshop 4: Focus Group	1 ½ hr.	Workshop agenda: •next steps for FDUC •focus group interview

Research Questions

This study's research questions were selected to explore community college faculty data use constructs of access, support, attitude, efficacy, and collaboration identified in the needs assessment and literature review. The research questions framed two aspects of the evaluation and analysis of the study. The first research question focused on evaluating the intervention process, and the following three research questions assessed the expected outcomes from the intervention:

RQ1: What was the level of faculty engagement in and satisfaction of the intervention?

RQ2: To what extent did the intervention change faculty's access and support to use data?

RQ3: What is the effect on faculty data use attitude and self-efficacy in using data after participating in this intervention?

RQ4: To what extent did the intervention change faculty's data use collaboration after participation in the intervention?

Faculty Members' Engagement and Satisfaction

Stufflebeam (2003) defines process evaluation as consisting of methods to provide feedback for managing the process, record and evaluate the work effort that will help interpret the intervention outcomes. The FDUC was evaluated for consistency with the planned activities, and participant engagement and satisfaction were measured after each session. The FDUC intervention's schedule and agendas were implemented as planned. Data logs on attendance and correspondence with participants who could not attend were kept during the intervention. Table 37 lists the number of participants and the rate of participation at each session.

Table 37

Faculty Data Use Collaborative Attendance and Participation Rate

Attendance and participation rate	Faculty data use workshop Session 1 (10/19)	Faculty data use workshop Session 2 (10/26)	Faculty data use workshop Session 3 (11/9)	Faculty data use workshop Session 4 (11/16)	Overall Participation Mean
<i>N</i> = 18	16 (89%)	16 (89%)	12 (67%)	12 (67%)	78%

The participation rate in the intervention was high, with an overall average of about 78% attendance in the workshop series. The last two sessions had the fewest attendees, as several faculty members had conflicts with the dates. On the day of the second workshop, a few of the

faculty members let the researcher know that they might not attend the afternoon session because they lived close to a wildfire and were on notice to evacuate their homes. However, the participation rate for the second day remained at almost 90%. Most faculty members who could not make a workshop session let the researcher know they had a conflict or could not attend. Several faculty members sent the researcher emails apologizing for missing a session due to a student or family matter. The sessions were also recorded, and two participants who missed sessions conveyed that they watched a session. The researcher also kept an attendance log and noted if faculty had previous conflicts and knew they could not attend. An optional session and individual meetings with data coaches were also scheduled and noted in the attendance log and summarized in Table 38.

Table 38

Faculty Attendance Logs

Participant	Session 1 1.5 hour	Session 2 1.5 hour	Optional sessions (time)	Session 3 1.5 hour	Session 4 1.5 hour	Total Hours
18	Yes	Yes	Yes (2.5)	Yes	Yes	8.5
16	Yes	Yes	Yes (1.5)	Yes	Yes	7.5
10	Yes	Yes	Yes (1)	Yes	Yes	7
12	yes	Yes		Yes	Yes	6
5	Yes	Yes		Yes	Yes	6
11	Yes	Yes		Yes	Yes	6
6	Yes	No (Fires)	Yes (1.5)	Yes	Yes	6
7	Yes	Yes	Yes (1.5)	Yes	No - conflict	5.5
1	Yes	Yes	Yes (1.5)	Yes	No	5
14	Yes	Yes		No - conflict	Yes	4.5
3	Yes	Yes		No - conflict	Yes	4.5
4	Yes	Yes		No	Yes	4.5
13	Yes	Yes		Yes	No - conflict	4.5
9	Yes	Yes		Yes	No	4.5
17	No - conflict	Yes		Yes	No - conflict	4.5
8	Yes	Yes		No - conflict	No - conflict	3
2	No - conflict	Yes		No	Yes	3
15	Yes	No (Fires)		No	Yes	3
Total Attended	16	16	6	12	12	

The researcher and data coaches took notes on session activities, feedback from discussions, and observations on the participants' engagement. After each session, the researcher and data coaches met to review the feedback forms and evaluate the workshop's activities. The team discussed what worked in the data presentations, any questions, and what could be improved. After each session, the debriefs with the data coaches provided valuable information to confirm interest in the data topics or refocus the content on specific questions from the faculty. The formative evaluations helped monitor the intervention's viability and fidelity (Zhang et al., 2011).

FDUC session satisfaction. After each session, the researcher administered feedback forms to ask faculty to rate the session and provide feedback to improve the session. The researcher evaluated participant satisfaction by the feedback forms received. Over the four sessions, 32 feedback forms were collected for a return rate of 57% over the four workshops. The feedback form contained two scored questions about the session. The first question asked how interested they were in the session topics, and the average rating on this question was high, at 4.38 on a five-point Likert scale. The rating on the usefulness of the sessions was slightly lower, with an average of 3.9. The faculty were asked to provide comments on the session as well. The feedback forms provided information on the faculty members' opinions of the session implementation and insights into the topics covered. Table 39 illustrates the feedback forms' return rate, session ratings, and comments on the usefulness and areas to improve each session.

Table 39

Faculty Data Use Collaborative Feedback Form Ratings and Summary Comments

Feedback form items	Faculty data use workshop Session 1	Faculty data use workshop Session 2	Faculty data use workshop Session 3	Faculty data use workshop Session 4	Totals
Feedback forms ^a	11	10	6	5	32
N attended session ^b	16	16	12	12	
Response rate ^c	69%	63%	50%	42%	
Interest in session topic ^d	4.36	4.50	4.33	4.20	
Workshop useful rating ^e	4.00	3.90	4.17	3.80	
Summary of faculty comments on what they found useful or helpful in the workshop.	<p>Understanding workshop goals (3)</p> <p>Understanding what and how much data are available (5)</p> <p>Learning about how to use it in teaching and effectiveness</p> <p>Finding out about other faculty's needs/hopes</p> <p>Instructor Dashboard</p> <p>Interested in specific data projects for the department and more on concurrently scheduled courses</p>	<p>Discussion on first-generation and transfer-bound students</p> <p>Getting different perspectives on faculty needs for the dashboard/Providing feedback (3)</p> <p>Thought about how to improve the quality of data and how to use data for the department</p> <p>How the data would help recruit students and evaluate the effectiveness</p> <p>Learning about different data sets and how to use them for planning</p>	<p>Sessions are coming together, and interesting to see how our data needs are closely aligned</p> <p>MAP (educational plans/majors) for students by classes</p> <p>"Love that you are finding ways to work with our individual needs. I now have much more hope that dance can get some good data to use!"</p> <p>Talking about how to display data, especially by course</p> <p>Dashboards are interesting and useful</p> <p>Hearing comments from others are also instructive and insightful</p> <p>More</p>	<p>Faculty from both colleges share mostly the same concerns and bring diverse examples which are very validating, as well as a variety of perspectives and suggestions for research approaches</p> <p>The quiz helped summarize what we learned in the seminar. I feel comfortable accessing data that I was not aware of before. It was a fun session.</p> <p>More</p>	
Comments on how the	Breakouts seem redundant	More defined goals for the group and faculty needs			

Feedback form items	Faculty data use workshop Session 1	Faculty data use workshop Session 2	Faculty data use workshop Session 3	Faculty data use workshop Session 4	Totals
session could be improved	Could be longer Nothing (3)	More focused questions More time for breakouts Having faculty review dashboards before the next session Less off-topic discussion	Thought today was great		

^{a-d} Rating Scale: 5 (*Extremely interested*), 4 (*Very interested*), 3 (*Somewhat interested*), 2 (*Not so interested*), 1 (*Not at all interested*).

^e Rating Scale: 5 (*Extremely useful*), 4 (*Very useful*), 3 (*Somewhat useful*), 2 (*Not so useful*), 1 (*Not at all useful*).

The comments in the feedback form provided information for the researcher and data coaches on the workshop's format and the topics covered in each session. The researcher and data coaches reviewed the feedback forms after each session and discussed their observations of the faculty members at the meeting and their engagement in the session topics.

An examination of this intervention process revealed a high degree of participation and adherence to the plan. The scores and comments provided a mechanism for the researcher to monitor the implementation and judge the implementation's fidelity related to interpreting the intervention outcomes (Stufflebeam, 2003). The faculty indicated a high interest in the workshop sessions and general belief in their usefulness. Faculty members' comments also identified valuable aspects of the intervention and a few improvements to the format. The FDUC's faculty engagement and satisfaction indicate a strong level of fidelity in the intervention's implementation. Baranowski and Stables (2000) suggest process evaluation describes and helps explain the intervention outcomes. The following sections will examine the findings from the three research questions focused on the data use constructs of access, support, attitude, efficacy, and collaboration. The first section of the outcome evaluation examines the quantitative findings from the Faculty Data Use Survey items and the a priori analyses and emergent themes in the qualitative data collected. The quantitative and qualitative analyses are examined separately in the next section. In subsequent sections, the quantitative and qualitative data are combined to address each research question.

Outcome Evaluation

As outlined in Chapter 4, the study used a convergent parallel mixed methods research design. First, the researcher examined any quantitative changes from pretest to posttest scores. Then using data from comments in the posttest and focus group transcripts, the qualitative data

were analyzed using an a priori and emergent data coding. This section will provide the initial analyses of the quantitative and qualitative data. In later sections, both data sets are combined to address each research question's findings.

Quantitative Approach

The Faculty Data Use Survey data informed a quasi-experimental one-group pretest and posttest for the quantitative strand of the research design. The scores from each data use construct were combined to create a mean score for each construct. A dependent samples *t*-test was conducted to understand any changes from the mean pre-scores after the intervention concluded. The researcher did not find any statistically significant differences in the pre and post means of the five constructs of data access, support, attitude, data efficacy, and collaboration (see Table 40).

Table 40

Data Use Construct Scores

Data Use Construct	Participants' Pre-Mean (n=18)	Participants' Post Mean (n=14)	Differences	Paired <i>t</i> -test	
Access	3.84	3.94	0.10	<i>t</i> = 0.45	<i>p</i> = .67
Support	2.99	3.30	0.33	<i>t</i> = 0.98	<i>p</i> = .33
Attitude	3.77	4.09	0.30	<i>t</i> = 1.04	<i>p</i> = .85
Self-Efficacy	3.22	3.71	0.43	<i>t</i> = 1.17	<i>p</i> = .80
Collaboration	2.83	2.70	-0.10	<i>t</i> = .44	<i>p</i> = .67

In further review of the data use constructs, the faculty members' pretest and posttest scores on the quantitative instrument may have been influenced by a ceiling effect for the data use constructs of access, support, attitude, and efficacy. The participants rated themselves reasonably high on the pretests, and the posttest scores were similar or slightly higher than the pretest scores. Several participants did not take the posttest survey and skipped some survey

questions, so there was incomplete or missing data. Figure 9 shows the pre-mean and post-mean scores for participants in each of the five data constructs were high at the start and end of the intervention.

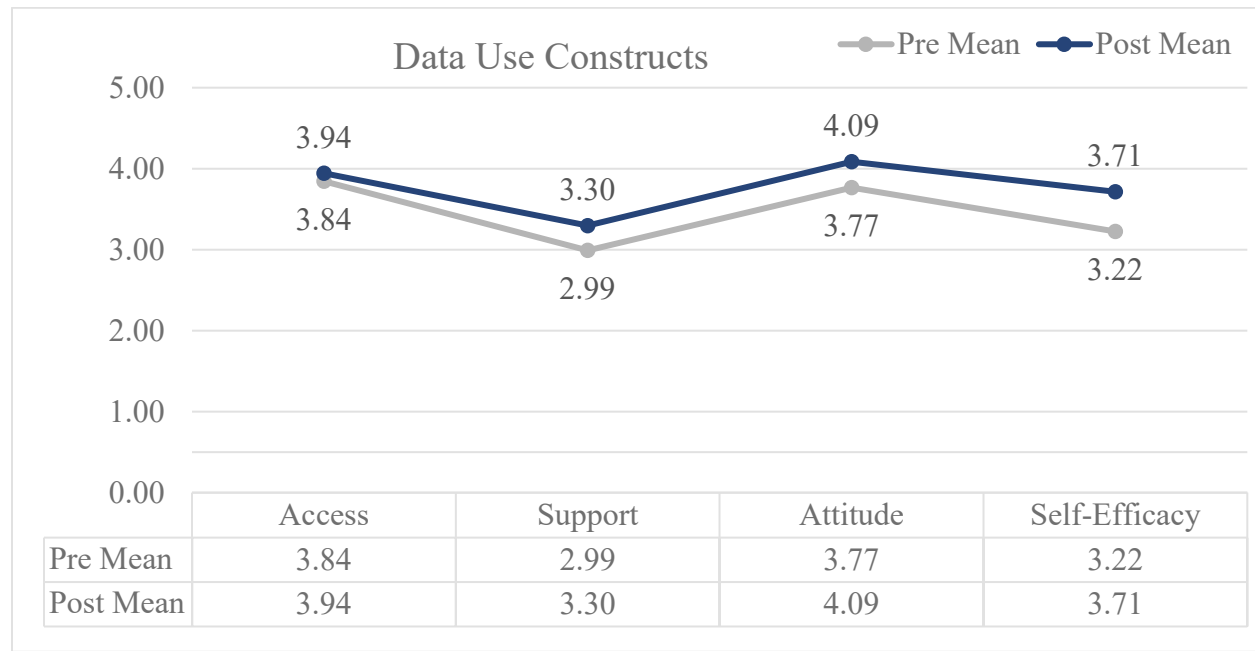


Figure 9. Data use construct scores.

Given no significant change between the pretest and posttest mean scores for the four data use constructs, the researcher analyzed the qualitative data.

Qualitative Approach

The post-intervention focus group and comments from the Faculty Data Use Survey were first analyzed using a priori coding of the data use construct. On subsequent coding reviews, subcodes and emergent themes were developed under each data use construct. Table 41 describes each a priori code and associated subcodes and emergent themes.

Table 41

Qualitative Coding - A Priori and Thematic Analyses

Data Use Constructs a priori coding	Subcodes	Themes
Access	Access data warehouse Navigation of data warehouse and usability of reports Needed data is hard to find in data warehouse	Access is challenging <ul style="list-style-type: none"> • Data Warehouse is challenging to navigate • Reports are difficult to use • Faculty can access data but do not have needed data
Support	Need support in accessing data they need Need support in understanding the data when they use it Need support in using data with others Need support from the IR Office	Faculty want training Training areas include: <ul style="list-style-type: none"> • Identifying needed data • Understanding the data attributes • Using data for their teaching • More training and professional development from IR Office
Attitude	Feel positive about using data for teaching Know data is useful for teaching, but barriers in accessing and using data Feel optimistic about using data but don't have data that is relevant to them	Barriers to Using Data Feel data is useful for teaching but do not use because there are barriers in getting relevant data and knowing how to apply data
Data Efficacy	Feel efficacious in using data for teaching Can use data but feel they can still learn/improve Feel more efficacious when collaborating	Room to Grow Feel efficacious but still feel they can learn and improve using data for teaching and students
Collaboration	Do not collaborate with other faculty or in their departments Value collaboration Want more opportunities to collaborate	Value but More is Needed <ul style="list-style-type: none"> • Most do not regularly collaborate with data • Value data collaboration • Want more opportunities for collaboration

The qualitative data analyses revealed emergent themes from the data use constructs that help understand the quantitative analyses. The researcher analyzed the emergent themes with descriptive statistics on individual survey items that revealed more insight in answering the research questions.

The following sections will examine each outcome research question by reviewing the individual survey items and emergent themes in each data use construct. First, data access is

described by faculty members' usage of the IR data warehouse and dashboard prototypes. Then specific survey items on access and support are combined with the qualitative thematic analyses. Next, the effects of the intervention on faculty members' data attitudes and efficacy are also examined using the individual survey items and emergent themes. Lastly, the last data use collaboration with the lowest scores in the survey items is explored further in the qualitative findings.

Faculty Data Access and Support

The faculty in the district expressed they did not access or use the IR data warehouse. All faculty members in the district have permission to use the IR data warehouse. They must log in through an employee-only intranet portal. A data warehouse usage report was reviewed to provide a frame of reference about participants' use of and familiarity with IR data.

Faculty data usage reports. The data warehouse usage report showed how many times participants accessed reports in the IR data warehouse over a calendar year before the intervention. There was wide variability between participants in their accessing reports in the data warehouse before the intervention. Of the 18 participants, five faculty were high IR data warehouse users, running between 100 to over 500 reports annually. Six participants were medium users (50 to 100 reports), seven faculty were low users (less than 50 reports), and four faculty had never run data warehouse reports before the workshop.

During the intervention, a prototype for individual faculty dashboards was presented. Weblinks to their dashboard and instructions on accessing the prototype were emailed several times to participants between the first and third workshop sessions. The participants were asked to review their dashboards and provide feedback to the researcher. The number of times the participants accessed the dashboard was analyzed. The participants accessed the dashboard from

low (0 to 5 times), medium (5 to 10 times), or high (over 10 times) frequency. One participant accessed the dashboard 26 times during the intervention, and six faculty did not access the dashboard at all.

The researcher reviewed the data warehouse and dashboard prototype levels of use compared to the faculty's participation hours in the intervention. Table 42 is sorted by accessing the IR data warehouse from the highest level of use to the lowest.

Table 42

Participant Data Access Levels: Sorted by Dashboard Prototype Access

Participant ID	IR data warehouse accessed	Dashboard prototype accessed	Intervention participation hours
16	1-High	1-High	7.5
10	1-High	1-High	7.5
5	1-High	1-High	6
13	1-High	2-Medium	4.5
8	1-High	3-Low	3
18	2-Medium	3-Low	8.5
12	2-Medium	1-High	6
6	2-Medium	1-High	6
7	2-Medium	2-Medium	5.5
1	2-Medium	3-Low	5
14	2-Medium	1-High	4.5
3	2-Medium	3-Low	4.5
15	2-Medium	2-Medium	3
11	3-Low	1-High	6
9	3-Low	2-Medium	4.5
4	3-Low	3-Low	4.5
17	3-Low	3-Low	4.5
2	3-Low	3-Low	3

Note. Data warehouse levels based on the number of times accessed reports: High (150 to 1,000 times), Medium (20 to 80 times), Low (0 to 10 times). Dashboard prototype levels based on viewing dashboards: High (10 to 30 views), Medium (2 to 9 views), Low (0 to 1 view).

The usage reports suggest that there were varying levels of use of the data tools by the faculty members. The following section will examine the research question of faculty members' access to data systems and support needed in using educational data. First, the data use construct of access findings are discussed, and then the support findings.

Access. The data access construct examined the faculty members' abilities to get into a data system, navigate it, and acquire needed data. A mean score was computed across all five items in the Faculty Data Use Survey access construct (see Table 43). A dependent paired samples *t*-test was conducted on the mean scores, and no statistically significant change was found from the pretest ($M = 3.84$, $SD = .69$) to the posttest ($M = 3.94$, $SD = .58$); $t(0.10) = 0.45$, $p = .67$. There was no change from pretest to posttest scores in the access construct after the intervention.

Table 43

Data Use Access Construct Mean Scores

Data use construct	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Difference pre to post
Access pretest	18	3.84	0.69	2.80	5.00	+1.00
Access posttest	14	3.94	0.58	2.80	5.00	

Although the average scores between the pretest and posttest access construct did not show any statistically significant change, individual items within the access construct are reviewed together with the qualitative data analysis. The access construct contained five items on accessing the technology, using the reports, and data types within the reports. Table 44 contains each item in the subscale, average scores, standard deviation, and differences between pretest and posttest scores.

Table 44

Data Use Access Items

Data use construct	Construct definition				
Access	Faculty's ability to access data needed in district systems				
Survey item (Section A)	Pre (N = 18)	Pre SD	Post (N = 14)	Post SD	Difference pre to post
1. I have the proper access to technology to efficiently examine data.	4.17	0.71	4.14	0.66	-.03
2. The inFORM data warehouse reports provide me access to lots of data	4.17	0.86	4.36	0.50	+0.19
3. The inFORM data warehouse reports are easy to use.	3.33	1.03	3.29	0.99	-0.04
4. The inFORM data warehouse reports allow me to examine various types of data at once (e.g., enrollment, success, demographics, etc.).	3.83	0.71	3.93	0.73	+0.10
5. The inFORM data warehouse reports generate displays (e.g., reports graphs, tables) that are useful to me.	3.72	0.96	4.00	0.88	+0.28

Note. Likert Scale: 5 (*Strongly Agree*), 4 (*Agree*), 3 (*Neither Agree Nor Disagree*), 2 (*Disagree*), 1 (*Strongly Disagree*).

The first two items in the access construct asked faculty members' access to technology, and there was general agreement that the use of technology and amount of data were appropriate. The last two items in the access subscale asked participants how data were displayed in the IR data warehouse. The faculty seemed to agree the data displays were helpful and see various types of data.

The one item in the subscale that had the lowest scores asked faculty if the reports were easy to use. The participants did not seem to agree that the reports in the data warehouse were usable. The qualitative data provided insights into the usability of the data warehouse reports.

Access is challenging. An emergent theme under access to data indicated that faculty felt the data warehouse was not easy to navigate, and menu options were difficult to understand. Participant 14 stated, "It could be more user-friendly. The drop-downs are clunky and take too much time." Participant 5 noted, "The drill-down functions of these reports are also not easy to utilize since it is hard to toggle back and forth." These comments aligned with the lower score on

the survey item about the ease of using IR data warehouse reports. An additional challenge faculty conveyed was that the IR reports' data were irrelevant to faculty needs:

The inFORM reports only show what the research department has chosen to display, not necessarily what I might want to see. While I could try to find and crunch the data myself, that is not taking advantage of the Inform tools and access. (Participant 11)

Another theme in the access construct was the difficulty in finding the correct data. Participant 5 stated, "I think the reports provide a lot of data, but it is difficult to know which specific reports are the ones I need at times, and some information I need is not readily available through the current reports." Some faculty wanted to test hypotheses using data that were not available in the data warehouse. For example, a faculty member wanted to see their students' credit loads for a semester and their work hours. This faculty member believed that many of their students did not realize the number of hours needed for their coursework to succeed. The member expressed many students might take too many classes while working full-time.

In the access construct, the findings showed that faculty believed that helpful technology tools and a lot of data were available; however, it was not easy to navigate the reports or find the data needed for their questions about students.

Support. Support included preparing and assisting teachers in using data, getting questions answered, and providing access to professional development. A mean score across all six items from the support construct was computed (see Table 45).

Table 45

Data Use Support Construct Mean Scores

Data use construct	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Difference pre to post
Support pretest	18	2.99	0.77	1.67	4.50	+0.31
Support posttest	14	3.30	0.97	1.00	4.67	

A dependent paired samples *t*-test was conducted, and no significant change was found from pretest ($M = 2.99$, $SD = .77$) to posttest ($M = 3.30$, $SD = .97$); $t(0.33) = 0.98$, $p = .33$.

Although the average scores between the pretest and posttest in the support construct showed no change in the overall scores, individual items provided additional insight into the different aspects of support. The support subscale used in this research included six items, and Table 46 contains each item in the construct, average scores, standard deviation, and differences between pretest and posttest scores.

Table 46

Data Use Support Items

Support Survey item (Section B)	Faculty's experience with support provided to use of data (training or professional development, data coach/specialist)				
	Pre ($n = 18$)	Pre <i>SD</i>	Post ($n = 14$)	Post <i>SD</i>	Difference pre to post
1. I am adequately supported in the effective use of data on my students and classes.	3.39	0.98	3.64	1.22	+0.25
2. I am adequately prepared to use data about my students and classes.	3.61	1.24	3.86	1.35	+0.25
3. There is someone who answers my questions about using data on my students and classes.	3.83	0.86	3.64	1.15	-0.19
4. There is someone who helps me change my practice (e.g., my teaching) based on data.	2.33	0.97	3.07	1.07	+0.74
5. My district provides enough professional development in data use.	2.11	0.83	2.57	1.09	+0.46
6. My district's professional development is useful for learning about data use.	2.67	1.09	3.00	1.24	+0.33

Note. Likert Scale: 5 (*Strongly Agree*), 4 (*Agree*), 3 (*Neither Agree Nor Disagree*), 2 (*Disagree*), 1 (*Strongly Disagree*). **Bolded item significant at the $p < .05$ (item 4, $n = 14$)**

The faculty were asked if they received support in using data on their students and classes; these items in the support subscale had the highest scores. These scores indicated that participants agreed that they had support in using data on their students and classes. The items with the lowest agreement about support indicated that the faculty members felt the district did not provide enough professional development in using data. This low agreement was evident in the qualitative analyses of support.

Faculty need more training. Faculty felt they could find support to use data but expressed they need much more help accessing, understanding, and using data. The analyses of support fell into three emergent themes. First, faculty wanted more training on accessing and using the district's IR data warehouse reports and dashboards. Participant 15 stated, "This training was great! But there could be more PD for faculty on inform and the dashboard." Participant 18 stated, "We definitely could use more training on data access and use. I don't think most faculty even know what they have access to." However, one faculty noted that the training must be relevant targeted to their needs. Participant 11 stated, "But I admit that I do not go to all related PD opportunities; I find canned presentations inefficient and usually not on point to my interests."

The second area of support was faculty needed help identifying and getting the data to answer their questions. The faculty asked many questions about how data were grouped in reports when reviewing the dashboard prototype. The participants conveyed the IR data warehouse reports did not accurately reflect how they evaluated their course offerings. For example, several levels of an art class were offered simultaneously with the same instructor in the arts. However, because the reports distinguished each level, total enrollments for all classes taught were not shown. The faculty member believed that this process misrepresented their program's enrollment numbers. The faculty member asked if the reports could be restructured to group all of the classes taught simultaneously. The data coaches noted these types of support in each session's debrief.

The last theme in the qualitative analysis regarded data use. A faculty member expressed the importance of how to use the data:

More professional development on what the data indicates (and does not) and how the data can most effectively be used. I think this becomes particularly important when we start to talk about data that might be controversial, or so when we start looking at equity data; for example, I think it's really wrong just to throw equity data at people. I think that we need to contextualize it. So, people understand what it means and don't misinterpret that data, right? Or if we start to look at things like the drop survey. I think that when we develop new data, there almost needs to be a professional development component of it, where there's that kind of discussion of what the data means and what you can do with it, and what you can't do with it, what it doesn't mean because I think those can be two very different things. (Participant 5)

The first three items in the support subscale seemed to indicate faculty felt somewhat supported in using data, but the last three items had lower mean scores. The faculty wanted more help in using the data warehouse and applying the data to their practice. Faculty wanted more professional development in using the data warehouse, but the training needs to be relevant to their data needs. Additionally, some faculty members wanted more support in applying the data they received to their teaching.

The qualitative data highlighted and deepened understanding of access and support aspects that were not evident in the Faculty Data Use Survey. Faculty members highlighted the usability of the reports in the data warehouse needed to be improved, and how data is represented in reports need to be configured for the faculty's context. Another area of support noted is supporting faculty in using data effectively. The themes of being supported in using data are continued in the following section that examines faculty members' data use attitude and efficacy.

Faculty Data Attitude and Efficacy

The third research question focused on how the intervention changed faculty members' attitudes about using data and their data use self-efficacy after participating in the intervention. As noted at the beginning of the outcome evaluation, the researcher found no significant changes in the faculty's attitude and efficacy before or after the intervention. There seemed to be a ceiling effect for these scores. Faculty members came into the study with a strong agreement that data are helpful for their teaching and that they could use the data for their practice, and this agreement remained high after the intervention. Yet, the qualitative analyses revealed some contradictions to the positive attitudes and strong self-efficacy in using data.

Data attitude. The FDU survey instrument contained five items to assess attitudes about using data for teaching practices. Faculty members' data use perspectives included seeing the value in data to understand students' learning and improve their instruction. A mean score was computed across all five items from the attitude subscale (see Table 47).

Table 47

Data Use Attitude Construct Mean Scores

Data use construct	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Difference pre to post
Attitude pretest	18	3.77	0.79	2.40	5.00	
Attitude posttest	14	4.09	0.92	2.20	5.00	+0.32

A dependent paired samples *t*-test was conducted, and no change was found from pretest ($M = 3.77$, $SD = .79$) to posttest ($M = 4.09$, $SD = .92$); $t(0.3) = 1.04$, $p = .85$. Although the pretest and posttest attitude constructs' average scores did not show any change, reviewing the items within the construct and the qualitative data helped provide a few insights into faculty's attitudes in using data and their use of data for teaching. The attitude scale in this study contained five items, and Table 50 describes each item, average scores, standard deviation, and differences

between pretest and posttest scores. The scores in this construct were high in that faculty had very positive attitudes that data help them plan and teach. The faculty's attitude items were high in agreement before and after the intervention (see Table 48).

Table 48

Data Use Attitude Items

Data attitude Survey item (Section C)	Faculty's attitude toward using data to improve their teaching and student learning.				
	Pre (<i>N</i> = 18)	Pre <i>SD</i>	Post (<i>N</i> = 14)	Post <i>SD</i>	Difference pre to post
1. Using data on my students and classes helps me plan my instruction.	3.78	0.94	4.07	1.14	+0.29
2. Using data offers me information about students that were not already known.	3.89	0.76	4.29	0.73	+0.40
3. Using data helps me know how students are doing in my class.	3.83	0.99	3.93	1.21	+0.10
4. Using data helps me identify how to help students learn better.	3.61	1.15	4.07	1.07	+0.46
5. Using data helps my students do better in my classes.	3.72	1.02	4.07	1.07	+0.35

Note. Likert Scale: 5 (*Strongly Agree*), 4 (*Agree*), 3 (*Neither Agree Nor Disagree*), 2 (*Disagree*), 1 (*Strongly Disagree*).

Although faculty members were positive that data was helpful, the qualitative data provided insights into if the relationship between faculty attitude and using data for the teaching. The qualitative data revealed that faculty felt using data is essential, but there were barriers to using data.

Barriers to using data. An emergent theme that emerged from the attitude construct coding is that many faculty members expressed they could use data but usually did not have the data they felt could help students. For example, Participant 5 stated the following:

I agree with all of these statements about data, but this does not correlate with my current ability to use data in the classroom. I can control the data I use within my class, but I do

not feel I have access to enough data about who my students are and their specific needs so that I can help them better. We get good general information about the students in our class, but not specific information. Which specific students, for example, struggle with writing so that I can be sure to offer them additional assistance; which of my students are first-semester college students, so I know to provide additional information on how to succeed in a college course; etc.

Another theme that emerged from the attitude construct was that faculty members wanted to use data and knew it was good to do, but they did not see how to apply it to their teaching. Several faculty members expressed they tried to make sense of using data for their discipline and students. For instance, Participant 3 stated the following:

In [department], data doesn't come into play as much as it might elsewhere. That is not to say we don't use data at all, or maybe we think of it differently. It often feels like data contorts us into trying to fit what we do into making decisions that can feel arbitrary, which is frustrating for us. My goal with data, since it does come into play a lot in SLO's (again, imposed), etc., is to learn to be more comfortable with it and try to understand how to apply it to what we do in a way that makes sense for us.

The faculty in the study all had positive attitudes toward using data before the intervention. The qualitative data showed that faculty had positive attitudes about using data even when challenged with knowing what data to use and how to use them.

Data efficacy. Data efficacy is measured by asking faculty if they feel good at using data to teach and understand student learning. The efficacy subscale contained seven items, and a mean score across all items was computed (see Table 49).

Table 49

Data Use Efficacy Construct Mean Scores

Data use construct	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Difference pre to post
Self-efficacy pre	16	3.22	1.20	1.00	4.71	+0.49
Self- efficacy post	14	3.71	1.15	1.00	5.00	

A dependent paired samples *t*-test was conducted on the mean scores, and no significant change was found from pretest ($M = 3.22$, $SD = 1.20$) to posttest ($M = 3.71$, $SD = 1.15$); $t(0.43) = 1.17$, $p = .80$. Like faculty members' attitude toward data use, the faculty also felt efficacious in using data for their students and classes. Table 50 describes each item in the subscale.

Table 50

Data Use Self-Efficacy Items

Data use self-efficacy Survey item (Section D)	Faculty's ability to use data to inform teaching				
	Pre (<i>n</i> = 16)	Pre <i>SD</i>	Post (<i>n</i> = 14)	Post <i>SD</i>	Difference pre to post
1. I am good at using data to diagnose student learning needs.	3.06	1.39	3.43	1.28	+0.37
2. I am good at formulating questions about my classes and know where to find the data to answer my questions.	2.94	1.18	3.79	1.05	+0.85
3. I am good at collecting data to answer questions about students in my classes.	3.25	1.18	3.79	1.31	+0.54
4. I am good at using data to plan my lessons.	3.06	1.24	3.36	1.34	+0.30
5. I am good at using statistics to analyze data about questions about my students.	3.19	1.42	3.71	1.44	+0.02
6. I am good at interpreting data from reports, charts, or graphs and drawing conclusions.	3.63	1.54	4.14	1.17	+0.51
7. I am good at adjusting instruction based on data.	3.44	1.21	3.79	1.19	+0.35

Note. Likert Scale: 5 (*Strongly Agree*), 4 (*Agree*), 3 (*Neither Agree Nor Disagree*), 2 (*Disagree*), 1 (*Strongly Disagree*). **Bolded item significant at the $p < .05$ (items 2,3 and 7, $n=13$)**

The faculty also rated their efficacy in using data reasonably high, although the mean scores were lower than the faculty's attitude toward using data. The scores in the items were all reasonably high in agreement, but the qualitative data revealed some contradictory findings.

Room to grow. In the qualitative analyses, the faculty felt efficacious, but many still expressed they could learn more about how to be better at using data. Two themes emerged from the participants when asked about their data use efficacy. First, many faculty knew how to use data but believed they could still improve and learn more. For example, Participant 15 stated, "Just started using more data, so feel like I still have a lot to learn." Participant 6 commented, "But I need more help in all these areas to get better at using the data available to help my instruction."

The second theme that emerged was more professional development would help the faculty with their data use efficacy. Another participant noted working with IR and faculty would help in faculty feeling they can use data effectively. For instance, Participant 5 stated, "Targeted discussions/training about how to best access the data I need and then use it would be helpful. This would require a joint effort with research analysts and faculty pedagogical experts that could be very useful for the colleges."

Faculty members in the study had positive attitudes about using data and their efficacy in using data for their teaching and students. However, the qualitative analysis revealed several contradictions to their high agreement in using and applying data. First, the faculty faced challenges getting the data they need for their teaching and they felt they could not use data for their teaching. Some faculty members expressed challenges in knowing how to apply the information they could access. Most faculty members commented they could still learn and improve to become better at using data. Lastly, several faculty members felt they could be more efficacious if they could use data with the help of the data coaches and other faculty.

Data Collaboration

The last research question focused on data use collaboration. Within the FDU survey instrument, faculty were first asked if they used data with or in a team or group for specific college projects. If faculty responded “yes,” they were shown the items in the data use collaboration construct. The subscale contained items that asked faculty about their experiences using data in a group or team for a defined purpose. The construct contained 10 items to assess faculty members’ use of data in a collaborative setting. A mean score across all 10 items from the collaboration construct was calculated (see Table 51). Of the five data use constructs explored, the collaboration construct's average score was the only construct score that decreased after the intervention.

Table 51

Data Use Collaboration Construct Mean Scores

Data use construct	<i>n</i>	<i>M</i>	<i>SD</i>	Minimum	Maximum	Difference pre to post
Collaboration pretest	11	2.83	0.87	1.70	4.00	-0.07
Collaboration posttest	13	2.70	0.80	1.60	4.40	

A dependent paired samples *t*-test showed no significant changes, with the following results: pretest ($M = 2.93$, $SD = 0.87$) and posttest ($M = 2.70$, $SD = 0.80$); $t(-0.10) = 0.44$, $p = .67$. Each item in the collaboration construct was reviewed. Table 52 illustrates the definition of the collaborative data use concept.

Table 52

Data Use Collaboration Items

Collaboration		Faculty's ability to use in a group setting for a specified educational issue or goal				
Survey item (Section E)		Pre (<i>n</i> = 11)	Pre <i>SD</i>	Post (<i>n</i> = 12)	Post <i>SD</i>	Difference pre to post
1.	We approach an issue by looking at data.	3.00	0.78	2.85	0.99	-0.15
2.	We discuss our preconceived beliefs about an issue.	2.82	0.98	2.75	1.06	-0.07
3.	We identify questions that we will seek to answer using data.	3.00	0.78	2.69	0.86	-0.31
4.	We explore data by looking for patterns and trends.	2.82	0.87	2.85	1.21	+0.03
5.	We draw conclusions based on data.	3.00	0.78	3.08	0.86	+0.08
6.	We identify additional data to offer a clearer picture of the issue.	2.64	1.12	2.62	1.04	-0.02
7.	We use data to make links between instruction and student outcomes.	2.73	0.91	2.46	0.78	-0.27
8.	When we consider changes in practice, we predict possible student outcomes.	2.91	0.94	2.69	1.11	-0.22
9.	We revisit predictions made in previous meetings.	2.55	1.21	2.38	1.12	-0.17
10.	We identify actionable solutions based on our conclusions.	2.82	0.87	2.62	1.19	-0.20

Note. Likert Scale: 5 (*Weekly*), 4 (*Monthly*), 3 (*A few times a year*), 2 (*One or two times a year*), 1 (*Never*). **Bolded item significant at the $p < .05$ (items 5 and 9, $n=8$)**

Unlike the other data use constructs, there was a decline from the pretest to the posttest scores. The Likert scale for the collaboration items differed from the other four constructs and asked faculty how often they experienced the situation described in each statement. One more faculty members answered these questions than the pretest. Scores for most of the items decreased in the posttest, indicating the faculty felt they collaborated less after the intervention. The qualitative data revealed more aspects of collaboration after the intervention.

Value collaboration, but more is needed. Many participants expressed they were motivated to collaborate but did not do it enough. Several comments in the survey showed

faculty members wanted to collaborate with other faculty about data. For example, Participant 5 stated the following:

These statements are all ideals that, unfortunately, we don't live up to on a regular basis! With SLO assessment data, we at least have to look at it annually. We also look at things like enrollment data regularly. I would like to find a way to bring more useful data that can help with instruction into my department meetings and dialogue about actionable solutions. We do this on occasion, but not enough.

In the focus group data, faculty shared they would like to collaborate in other venues such as department meetings, instructional councils, and college committees. They expressed that they use data as department chairs to analyze their programs and fulfill reporting requirements but do not dialogue in their departments or other departments about educational data questions. One faculty member shared that although they liked to collaborate, it might be difficult for other faculty members unmotivated or unreceptive to a collaborative format:

I love this kind of stuff. And I'm always interested in how to how to make my teaching better, and how to make my department better. And I think all of us are, so but it's not the same thing as talking to other faculty members, who I know would rather not necessarily look into this can. So, I'm not sure exactly how to how to make it go widespread. I certainly will not attempt to make other faculty members interested in data. I've tried that it doesn't work. (Participant 18)

Faculty members also commented in the focus group that they liked the format of the intervention. This participant's comment highlighted why they valued a collaborative approach:

But I really like this format, where we can bounce ideas off each other because I think taking a survey or doing something on your own, you don't necessarily see how you

could use data in different ways, where once we get into a dialogue about it, I think, it just stimulates ideas. So, I think having these kinds of summits or workshops, or what have you, is probably the way to go rather than people individually, just thinking of what might or might not work for them. And maybe it could be on a departmental level; maybe there could be kind of workshops within departments going over, starting at program review data, or starting with the faculty dashboards and how to understand it. And then people can start talking within their group about how this might be useful in my views, and then expand from there. (Participant 5)

Faculty members also mentioned that they appreciated having faculty members from the other college and various disciplines. They noted that they could learn how other faculty approached using data and learn strategies they have applied in their classes or teaching.

Discussion

The FDUC was designed to explore conceptual data use factors and to improve faculty data use. Although the data use constructs analyzed showed no change from pretest to posttest, individual survey items and themes that emerged from the qualitative data provided insights into how faculty viewed barriers and supports of data use. These insights confirmed using the reports and navigating the data systems were challenging when trying to access data. They confirmed that the IR data system needed to be usable and relevant for faculty needs.

Faculty came into the intervention with positive attitudes about the usefulness of data to inform educational questions and improve academic achievement. The faculty were engaged in the FDUC. The survey scores in data attitude and efficacy indicated they felt positive about and confident in using data for their teaching practices before and after the intervention. However, the qualitative data revealed, as efficacious as some faculty members felt, they also expressed,

after the intervention, that they needed more training and support to get better at accessing and using data. The faculty shared the significant barriers to them feeling more efficacious: not knowing how to find the data they needed or how to apply them to their teaching practice.

In analyzing all the data use constructs, the need for more training on using the data warehouse and professional development in applying data to their teaching practice were emergent themes that would improve faculty's access, support, attitude, and efficacy. The scores for collaboration declined following the intervention, which could indicate the faculty felt they did not collaborate as much as they thought they did before the intervention. One hypothesis is that faculty may have thought they engaged collaboratively with data, but they saw they were not engaging as much as they had initially thought after the intervention. The intervention could have made them more aware of additional ways they could collaborate when using data. Analysis of the qualitative data showed that faculty members felt that having a workshop with other faculty and the IR office data coaches was valuable. Faculty members expressed they learned from one another's experiences about using data and wanted more opportunities to collaborate, particularly within their departments. They noted that having a data coach from the IR office to help locate and apply data for their teaching practices is beneficial.

Implications for Practice

A goal of the intervention was to understand how the IR office could improve its services to faculty. Although the FDUC had only 18 participants, this study's results could improve the IR data systems, the usability of reports, and future data use professional development. Another critical area for development in the IR office is professional development for IR office staff and building their skills in their work with faculty members.

Improve usability of the data warehouse. Several faculty members expressed that the data warehouse reports were difficult to navigate and use. The IR Office should evaluate the existing reports for usability by faculty. Additionally, all new reports should be reviewed and tested by faculty for relevance and usability by faculty. The online workshop posed some challenges for the data coaches. The data coaches believed that a setting where they could see how the faculty accessed the data and where they went in the IR data warehouse might help them better understand their challenges when finding or using a report.

Improve faculty development related to data warehouse use. Many participants stated more training and ongoing professional development were needed to support their use of the data warehouse. The IR office should develop a training program for faculty to understand what data and reports are available in the data warehouse that pertains to faculty needs. Creating tutorials or aids on locating and using reports would also help faculty navigate the data warehouse.

Create more collaborative spaces for faculty development. The faculty also valued peer learning with support from the IR office and wanted more opportunities. They wanted more time and space to work with one another and data coaches. The IR office should prioritize more collaborative training and professional development over individual sessions. The IR office can also work with faculty leaders to develop more embedded professional development in using data. One faculty member noted that faculty development coordinators should work with the IR office to develop training relevant to department chairs or college initiatives that help the faculty see how using data is connected to their work.

Unexpected outcome. An unexpected outcome was the development of relationships between the IR office and participants. One faculty member who was not comfortable with using data shared his experience in the FDUC.

I recognized a real passion for data in the people who are on the data team. And while I can't relate to the data at all, I can relate to the passion, and if I can begin to understand it, I am hoping I can begin using data in service of the students.

(Participant 3)

Building a stronger relationship between the IR office and faculty was not an intended outcome or part of the conceptual framework but was a positive outcome of the intervention. This relationship is vital to the IR office's continued support of faculty data use and all the areas identified for improvement to the office's services. The data coaches also reflected on their experiences in the FDUC and seemed to enjoy building a relationship with the participants:

I think the breakout sessions were really a good opportunity for us to get to know them more, and I feel like you can actually feel comfortable and ask actual questions. And it was a nice opportunity to engage with them. And some of the faculty I've never met before. So, it was kind of nice to build relationships with them. Because if not, I wouldn't really have contact with some of the faculty. So, it was nice actually to be able to connect with them. And get feedback with the transfer and majors' work; it was nice to get their perspective and see from their view and how they engage with the data and how they see it. It was a very nice way to also how they connect to it, and the [compare] the way we look at it. I thought that was really, really helpful. (Data Coach 3)

Developing the interpersonal skill set of the IR office is a crucial area of service that may need further research and exploration. Institutional research offices can be seen as keepers of data and not approachable. Some faculty members may feel hesitant to use data or feel they are not skilled in statistics. Building relationships and networks with faculty may help them not feel intimidated to use data.

I loved our workshop, even if its only benefit was to create a better relationship between your team and me. Now that I know who you are, I am much more likely to approach you with requests. That's what I'm most happy about. (Participant 18)

Professional development for IR staff. A few IR staff felt challenged in the workshop sessions. In some of the debrief sessions, the data coaches expressed some difficulty handling strong faculty personalities when facilitating discussions. The intervention revealed some of the challenges that can occur when IR staff work directly with stakeholders. More and more IR professionals are being asked to become teachers and facilitators of data systems rather than solely producing reports or studies. The FDUC allowed the data coaches to teach faculty about the data and analyze the data together. One data coach said they liked learning how faculty interpreted the data for their discipline and about their students. Understanding faculty data needs was a vital goal of the intervention and links to the usability of the data warehouse. The IR office will need to continue to hone its staff's skills in facilitating discussions that identify critical areas of data need.

Limitations

This study had several limitations, including sample size, participant attrition, intervention length, and biases. The study's population sample size consisted of 18 full-time community college faculty who worked in the West Coast region of the United States. A purposeful sample of full-time faculty in the community college district was chosen based on the accessibility to the location; however, larger sample sizes would be needed for generalizability. Participation in the intervention remained voluntary, and the faculty were positive in their outlooks about using educational data. This positivity was reflected in the high data use pretest

scores. The faculty in the FDUC wanted to learn to access and use data more. A future researcher can recruit faculty who do not have high data use scores on the pretest.

Another limitation was participant attrition (see Shadish et al., 2002). The last two sessions of the workshop series only had 12 of the 18 participants. Several participants emailed the researcher to explain competing demands, such as family or workload issues, which made them unable to attend sessions. Posttest data were only collected from 14 of the 18 participants, so missing data weakened the amount of data available to compare to the pretest scores.

The mixed-method design was used to strengthen findings within the small sample size and attrition of participants. Descriptive statistics combined with the qualitative analysis showed additional insights into the data use constructs that could be further understood with a larger sample size in different settings. Descriptive statistics showed small nonsignificant positive changes in the participants' data use attitudes and self-efficacy. For future studies, inferential statistics could be rerun with a larger sample size to explore these findings. The faculty participants had diverse backgrounds in the various disciplines they taught and the number of years of teaching in the district. However, the sample was too small to find any statistical difference between participants. A larger sample size could be further explored to see if any difference might exist between participant characteristics.

Four planned FDUC workshop sessions and one optional session were conducted over six weeks. The average hours of professional development per participant were about five hours. Effective K-12 professional developmental leaders use job-embedded designs and sustained professional development opportunities (Darling-Hammond et al., 2017). A limitation of the intervention was the short timeframe, and the participants expressed wanting more opportunities to use and engage in data collaboration. The participants did not have enough time to use data

with other colleagues in their departments or fully explore an educational question with the data coaches.

Qualitative data showed new insights into faculty data use constructs. Several qualitative validation strategies were used to strengthen the study's validity and expose any researcher bias. Triangulation between quantitative and qualitative measures was used to ensure a robust quantitative statistic validation (see Creswell & Plano Clark, 2018). Researchers use validity in qualitative analysis to confirm the participant's lens and those external to the study (Creswell & Miller, 2000). In determining the trustworthiness of the qualitative analysis, peer debriefing with the data coaches was used to clarify interpretations and monitor biases. Member checking with two participants indicated further validation of the researcher's categories and interpretations of data.

Milner's (2007) discussion on unforeseen dangers was another vital piece to consider and be aware of when examining the study's validity. I used my position in the organization to have direct access to data on faculty. I also have long-standing work relationships and friendships with faculty, and I believe that these relationships enhance my ability to understand many historical, cultural, and political aspects of faculty in my context. Both elements may also make the analysis open to unintentional bias. Member checking was used to validate the findings and conclusions (see Milner, 2007).

Conclusion and Future Research

This researcher examined 18 full-time faculty experiences in an FDUC workshop series of the data use constructs of access, support, attitude, self-efficacy, and collaboration. Although no statistically significant changes were found between the pretest and posttest scores on the survey instrument, descriptive statistics on individual survey items showed slight increases in

participants' data use access, support, attitude, and self-efficacy scores. Qualitative evidence showed quantitative data that indicated that data access and support concepts might be related constructs. Although participants could access the IR data system, understanding how to use the reports or find the information needed was not easy. The participants provided examples of necessary support, such as providing more training on the IR data system; using the reports; and creating more information about faculty courses, programs, and students.

The qualitative evidence indicated a relationship between attitude toward using data for teaching and learning and data use self-efficacy. The participants scored high regarding having a positive attitude and efficacy for using data to inform their teaching practices and help students. However, many participants believed that they still could learn more about the available data and how to use those data for their instructional practices. A theme that emerged in the data about intervention outcomes was that the relationship between the IR office and participants was strengthened.

Grounded in adult learning theory (Knowles et al., 2014) and effective professional development practices (Darling-Hammond et al., 2017; Guskey, 2002), this researcher provided a window into exploring collaborative professional development experience for community college faculty. The researcher found factors that might positively impact faculty members' use of data for teaching and improving educational outcomes for students. This intervention researcher examined barriers and supports that could be adjusted and further studied to improve faculty members' abilities to use data to improve their teaching practices and student learning.

Future research is needed to continue understanding the impact of ongoing and sustained data support from IR. Creating more collaborative data use opportunities for faculty is critical to study the effect of data coaches in learning. The IR office staff provides support that spans the

institution and represents a learning capacity across the organization (Bryk, Gomez, Grunow, & LeMahieu, 2015). The IR office staff should continue to build their abilities to understand and support faculty members' data use. Creating a faculty data use networked community may help the district leaders' learning. Future researchers should get closer to faculty members' use of data and the impact on their students' learning. Refining community colleges' faculty data use constructs that most impact student learning is essential to understand how to use data for improvement purposes.

References

- Ackoff, R. L. (1989). From data to wisdom. *Journal of Applied Systems Analysis*, 16(1), 3–9.
Retrieved from <https://softwarezen.me/wp-content/uploads/2018/01/datawisdom.pdf>
- Avalos, B. (2011). Teacher professional development in "teaching and teacher education" over ten years. *Teaching and Teacher Education: An International Journal of Research and Studies*, 27(1), 10–20. doi:10.1016/j.tate.2010.08.007
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: W.H. Freeman.
- Banks, J. A. (2014). Diversity, group identity, and citizenship education in a global age. *Journal of Education*, 194(3), 1–12. doi:10.1177/002205741419400302
- Baranowski, T., & Stables, G. (2000). Process evaluations of the 5-a day projects. *Health Education and Behavior*, 27, 157-166. doi:10.1177/109019810002700202
- Bolhuis, E., Schildkamp, K., & Voogt, J. (2016a). Data-based decision making in teams: Enablers and barriers. *Educational Research and Evaluation*, 22(3-4), 213–233. doi:10.1080/13803611.2016.1247728
- Bolhuis, E., Schildkamp, K., & Voogt, J. (2016b). Improving teacher education in the Netherlands: Data team as learning team? *European Journal of Teacher Education*, 39(3), 320–339. doi:10.1080/02619768.2016.1171313
- Bolhuis, E., Voogt, J., & Schildkamp, K. (2019). The development of data use, data skills, and positive attitude towards data use in a data team intervention for teacher educators. *Studies in Educational Evaluation*, 60, 99–108. doi:10.1016/j.stueduc.2018.12.002
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.

- Brown, J. (2017). The seven silos of accountability in higher education: Systematizing multiple logics and fields. *Research & Practice in Assessment, 11*, 41–58. Retrieved from <http://www.rpajournal.com/>
- Brown, J. (2018). Leading colleges & universities in a new policy era: How to understand the complex landscape of higher education accountability. *Change: The Magazine of Higher Learning, 50*(2), 30–39. doi:10.1080/00091383.2018.1483175
- Brown, N., Hewitt, G., Lin, W., & Vater, R. (2017). The evolution of institutional-research professionals in small- and medium-sized institutions. *New Directions for Institutional Research, 2017*(173), 89–96. doi:10.1002/ir.20215
- Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. G. (2015). *Learning to improve: How America's schools can get better at getting better*. Cambridge, MA: Harvard Education Press.
- Calvert, L. (2016). *Moving from compliance to agency: What teachers need to make professional learning work*. Oxford, OH: Learning Forward and NCTAF.
- Cho, V., & Wayman, J. (2015). Assumptions, strategies, and organization: Central office implementation of computer data systems. *Journal of School Leadership, 25*(6), 1203–1236. doi:10.1177/105268461502500607
- Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education, 18*(8), 947–967. doi:10.1016/S0742-051X(02)00053-7
- Coburn, C., & Turner, E. (2011). Research on data use: A framework and analysis. *Measurement, 9*(4), 173–206. doi:10.1080/15366367.2011.626729

- Cowie, B., & Cooper, B. (2017). Exploring the challenge of developing student teacher data literacy. *Assessment in Education: Principles, Policy & Practice*, 24(2), 147–163. doi:10.1080/0969594X.2016.1225668
- Cox, B. E., Thompson, K., Anderson, A., Mintz, A., Locks, T., Morgan, L., . . . Wolz, A. (2017). College experiences for students with autism spectrum disorder: Personal identity, public disclosure, and institutional support. *Journal of College Student Development*, 58(1), 71–87. doi:10.1353/csd.2017.0004
- Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, 39(3), 124–130. doi:10.1207/s15430421tip3903_2
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Thousand Oaks, CA: Sage.
- Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development*. Palo Alto, CA: Learning Policy Institute.
- Datnow, A., & Hubbard, L. (2016). Teacher capacity for and beliefs about data-driven decision making: A literature review of international research. *Journal of Educational Change*, 17(1), 7–28. Retrieved from <https://link.springer.com/journal/10833>
- Datnow, A., Park, V., & Kennedy-Lewis, B. (2013). Affordances and constraints in the context of teacher collaboration for the purpose of data use. *Journal of Educational Administration*, 51(3), 341–362. doi:10.1108/09578231311311500
- Dejean, M., Chen, Y., Baber, L., & Li, R. (2018). Perceptions of data-driven decision making on student success: A study of culture, collaboration, and advocacy among community college leaders. *Community College Enterprise*, 24(1), 41–59. Retrieved from <http://www.schoolcraft.edu/cce/community-college-enterprise>

- Desimone, L., & Le Floch, K. (2004). Are we asking the right questions? using cognitive interviews to improve surveys in education research. *Educational Evaluation and Policy Analysis*, 26(1), 1–22. doi:10.3102%2F01623737026001001
- Dunn, K. E., Airola, D. T., Lo, W., & Garrison, M. (2013a). Becoming data driven: The influence of teachers' sense of efficacy on concerns related to data-driven decision making. *Journal of Experimental Education*, 81(2), Art. 222. doi:10.1080/00220973.2012.699899
- Dunn, K. E., Airola, D. T., Lo, W., & Garrison, M. (2013b). What teachers think about what they can do with data: Development and validation of the data driven decision-making efficacy and anxiety inventory. *Contemporary Educational Psychology*, 38(1), 87–98. doi:10.1016/j.cedpsych.2012.11.002
- Dusenbury, L., Brannigan, R., Falco, M., & Hansen, W. B. (2003). A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings. *Health Education Research*, 18(2), 237–256. doi:10.1093/her/18.2.237
- Ebbeler, J., Poortman, C. L., Schildkamp, K., & Pieters, J. M. (2016). Effects of a data use intervention on educators' use of knowledge and skills. *Studies in Educational Evaluation*, 48, 19–31. doi:10.1016/j.stueduc.2015.11.002
- Farley-Ripple, E., & Buttram, J. (2015). The development of capacity for data use: The role of teacher networks in an elementary school. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org>
- Farrell, C., & Marsh, J. (2016a). Contributing conditions: A qualitative comparative analysis of teachers' instructional responses to data. *Teaching and Teacher Education*, 60, 398–412. doi:10.1016/j.tate.2016.07.010

- Farrell, C., & Marsh, J. (2016b). Metrics matter: How properties and perceptions of data shape teachers' instructional responses. *Educational Administration Quarterly*, 52(3), Art. 423. doi:10.1177/0013161X16638429
- Frické, M. H. (2018). Data-information-knowledge-wisdom (DIKW) pyramid. In L. A. Schintler, & C. L. McNeely (Eds.), *Encyclopedia of big data*. doi:10.1007/978-3-319-32001-4_331-1
- Gummer, E., & Mandinach, E. (2015). Building a conceptual framework for data literacy. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org>
- Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching*, 8, 381–391. doi:10.1080/135406002100000512
- Guskey, T. R. (2014). Measuring the effectiveness of educators' professional development. In L. E. Martin, S. Karagler, D. J. Quatroche, & K. L. Bauserman (Eds.), *Handbook of professional development in education: Successful models and practices, PreK-12* (pp. 447–466). New York, NY: Guilford Press.
- Hora, M. (2012). Organizational factors and instructional decision-making: A cognitive perspective. *Review of Higher Education*, 35(2), 207–235. doi:10.1353/rhe.2012.0001
- Hora, M., Bouwma-Gearhart, J., & Park, H. (2014). Exploring data-driven decision-making in the field: How faculty use data and other forms of information to guide instructional decision-making (WCER Working Paper No. 2014-3). *Wisconsin Center for Education Research*. Retrieved from <https://www.wcer.wisc.edu/>
- Hora, M., Bouwma-Gearhart, J., & Park, H. (2017). Data driven decision-making in the era of accountability: Fostering faculty data cultures for learning. *Review of Higher Education*, 40(3), 391–426. doi:10.1353/rhe.2017.0013

- Hora, M., & Smolarek, B. (2018). Examining faculty reflective practice: A call for critical awareness and institutional support. *The Journal of Higher Education*, 89(4), 553–581. doi:10.1080/00221546.2018.1437663
- Huguet, A., Marsh, J., & Farrell, C. (2014). Building teachers' data-use capacity: Insights from strong and developing coaches. *Education Policy Analysis Archives*, 22(52), 1–28. Retrieved from <https://www.redalyc.org/pdf/2750/275031898069.pdf>
- Ikemoto, G. S., & Marsh, J. A. (2007). Chapter 5 cutting through the "data-driven" mantra: Different conceptions of data-driven decision making. *Yearbook of the National Society for the Study of Education*, 106(1), 105–131. doi:10.1111/j.1744-7984.2007.00099.x
- Jenkins, P. D., & Kerrigan, M. R. (2008). *Evidence-based decision making in community colleges: Findings from a survey of faculty and administrator data use at achieving the dream colleges*. Columbia University. doi:10.7916/D8QZ281Q
- Jimerson, J. B. (2016). How are we approaching data-informed practice? Development of the survey of data use and professional learning. *Educational Assessment, Evaluation and Accountability*, 28(1), 61–87. doi:10.1007/s11092-015-9222-9
- Jimerson, J. B., & Childs, J. (2017). Signal and symbol: How state and local policies address data-informed practice. *Educational Policy*, 31(5), 584–614. doi:10.1177/0895904815613444
- Jimerson, J. B., Cho, V., & Wayman, J. (2016). Student-involved data use: Teacher practices and considerations for professional learning. *Teaching and Teacher Education*, 60, Art. 413. doi:10.1016/j.tate.2016.07.008

- Jimerson, J. B., Garry, V., Poortman, C. L., & Schildkamp, K. (2020). Implementation of a collaborative data use model in a United States context. *Studies in Educational Evaluation*. Advance online publication. doi:10.1016/j.stueduc.2020.100866
- Jimerson, J. B., & McGhee, M. (2013). Leading inquiry in schools: Examining mental models of data-informed practice. *Current Issues in Education*, 16(1), 1–21. Retrieved from <https://cie.asu.edu/ojs/index.php/cieatasu>
- Jimerson, J. B., & Reames, E. (2015). Student-involved data use: Establishing the evidence base. *Journal of Educational Change*, 16(3), 281–304. doi:10.1007/s10833-015-9246-4
- Jimerson, J. B., & Wayman, J. C. (2015). Professional learning for using data: Examining teacher needs and supports. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org>
- Johnson, B., & Onwuegbuzie, A. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14–26.
doi:10.3102%2F0013189X033007014
- Johnson, B., Onwuegbuzie, A., & Turner, L. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112–133.
doi:10.1177%2F1558689806298224
- Kallemeyn, L. (2014). School-level organizational routines for learning: Supporting data use. *Journal of Educational Administration*, 52(4), 529–548. doi:10.1108/JEA-02-2013-0025
- Kerrigan, M. R. (2014). A framework for understanding community colleges' organizational capacity for data use: A convergent parallel mixed methods study. *Journal of Mixed Methods Research*, 8(4), 341–362. doi:10.1177/1558689814523518

- Kerrigan, M. R. (2015). Social capital in data-driven community college reform. *Community College Journal of Research and Practice*, 39(7), 603–618.
doi:10.1080/10668926.2013.866061
- Kerrigan, M. R., & Jenkins, D. (2013). *A growing culture of evidence? findings from a survey on data use at achieving the dream colleges in Washington state*. New York, NY: Community College Research Center, Columbia University.
- Kippers, W. B., Poortman, C. L., Schildkamp, K., & Visscher, A. J. (2018). Data literacy: What do educators learn and struggle with during a data use intervention? *Studies in Educational Evaluation*, 56, 21–31. doi:10.1016/j.stueduc.2017.11.001
- Kirby, Y. K., & Floyd, N. D. (2016). Maximizing institutional research impact through building relationships and collaborating within the institution. *New Directions for Institutional Research*, 2015(166), 47–59. doi:10.1002/ir.20130
- Klein, C., Lester, J., Rangwala, H., & Johri, A. (2019). Learning analytics tools in higher education: Adoption at the intersection of institutional commitment and individual action. *The Review of Higher Education*, 42(2), 565–593. doi:10.1353/rhe.2019.0007
- Knowles, M. S., Holton, E. F., & Swanson, R. A. (2014). *The adult learner* (8th ed.). New York, NY: Routledge.
- Levin, J., & Datnow, A. (2012). The principal role in data-driven decision making: Using case-study data to develop multi-mediator models of educational reform. *School Effectiveness and School Improvement*, 23(2), Art. 179. Retrieved from <http://www.tandfonline.com/loi/nses20>

- Leviton, L. C., & Lipsey, M. (2007). A big chapter about small theories: Theory as method: Small theories of treatments. *New Directions for Evaluation*, 114, 27–62.
doi:10.1002/ev.224
- Lochmiller, C., & Lester, J. (2017). *An introduction to educational research: Connecting methods to practice*. Los Angeles, CA: Sage.
- Lumina Foundation. (2021). *Achieving the Dream*. Retrieved from <https://www.achievingthedream.org/org/371/lumina-foundation>
- Luo, M. (2008). Structural equation modeling for high school principals' data-driven decision making: An analysis of information use environments. *Educational Administration Quarterly*, 44(5), 603–634. doi:10.1177/0013161X08321506
- Mandinach, E. B. (2012). A perfect time for data use: Using data-driven decision making to inform practice. *Educational Psychologist*, 47(2), 71–85.
doi:10.1080/00461520.2012.667064
- Mandinach, E. B., Friedman, J. M., & Gummer, E. (2015). How can schools of education help to build educators' capacity to use data? A systemic view of the issue. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org/>
- Mandinach, E. B., & Gummer, E. (2015). Data-driven decision making: Components of the enculturation of data use in education. *Teachers College Record*, 117(4), Art. 1.
Retrieved from <http://www.tcrecord.org/>
- Mandinach, E. B., & Gummer, E. (2016). What does it mean for teachers to be data literate: Laying out the skills, knowledge, and dispositions? *Teaching and Teacher Education*, 60, 366–376. doi:10.1016/j.tate.2016.07.011

- Mandinach, E. B., & Jimerson, J. B. (2016). Teachers learning how to use data: A synthesis of the issues and what is known. *Teaching and Teacher Education*, 60, 452–457.
doi:10.1016/j.tate.2016.07.009
- Mandinach, E. B., & Schildkamp, K. (2020). Misconceptions about data-based decision making in education: An exploration of the literature. *Studies in Educational Evaluation*.
Advance online publication. doi:10.1016/j.stueduc.2020.100842
- Marsh, J., Bertrand, M., & Huguet, A. (2015). Using data to alter instructional practice: The mediating role of coaches and professional learning communities. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org>
- Marsh, J., & Farrell, C. (2015). How leaders can support teachers with data-driven decision making: A framework for understanding capacity building. *Educational Management Administration & Leadership*, 43(2), 269–289. doi:10.1177/1741143214537229
- McCoy, C., & Shih, P. C. (2016). Teachers as producers of data analytics: A case study of a teacher-focused educational data science program. *Journal of Learning Analytics*, 3(3), 193–214. doi:10.18608/jla.2016.33.10
- Milner, H. R., IV. (2007). Race, culture, and researcher positionality: Working through dangers seen, unseen, and unforeseen. *Educational Researcher*, 36(7), 388–400.
doi:10.3102/%2F0013189X07309471
- Moore, J. E., Smith, D., Schultz-Jones, B., & Marino, J. (2019). Data literacy: School librarians as data coaches. *International Association of School Librarianship. Selected Papers from the Annual Conference*, 1, 1–8. Retrieved from https://twu-ir.tdl.org/bitstream/handle/11274/12115/Moore_DataLiteracySchool_PUB.pdf?sequence=1

- Morest, V. (2009). Accountability, accreditation, and continuous improvement: Building a culture of evidence. *New Directions for Institutional Research*, 143, 17–27. Retrieved from <https://ccrc.tc.columbia.edu/>
- Morest, V., & Jenkins, D. (2007). *Institutional research and the culture of evidence at community colleges* (Report No. 1 in the Culture of Evidence Series). Retrieved from <https://ccrc.tc.columbia.edu/>
- Neal, J. W., & Neal, Z. P. (2013). Nested or networked? Future directions for ecological systems theory. *Social Development*, 22(4), 722–737. doi:10.1111/sode.12018
- Prenger, R., & Schildkamp, K. (2018). Data-based decision making for teacher and student learning: A psychological perspective on the role of the teacher. *Educational Psychology*, 38(6), 734–752. doi:10.1080/01443410.2018.1426834
- QSR International. (2018). NVivo [computer software]. Retrieved from <https://www.qsrinternational.com/nvivo-qualitative-data-analysis-software/home>
- Reeves, T. D. (2017). Pre-service teachers' data use opportunities during student teaching. *Teaching and Teacher Education*, 63, 263–273. doi:10.1016/j.tate.2017.01.003
- Reeves, T. D., & Chiang, J. (2018). Online interventions to promote teacher data-driven decision making: Optimizing design to maximize impact. *Studies in Educational Evaluation*, 59, 256–269. doi:10.1016/j.stueduc.2018.09.006
- Reeves, T. D., & Honig, S. L. (2015). A classroom data literacy intervention for pre-service teachers. *Teaching and Teacher Education*, 50, 90–101. doi:10.1016/j.tate.2015.05.007
- Reeves, T. D., Summers, K. H., & Grove, E. (2016). Examining the landscape of teacher learning for data use: The case of Illinois. *Cogent Education*, 3(1), Art. 1211476. doi:10.1080/2331186X.2016.1211476

- Rice, G. (2011). *The association for institutional research: The first 50 years*. Tallahassee, FL: Association for Institutional Research.
- Rohlwing, R. L., & Spelman, M. (2014). Characteristics of adult learning: Implications for the design and implementation of professional development programs. In L. E. Martin, S. Kragler, D. J. Quatroche, & K. L. Bauserman (Eds.), *Handbook of professional development in education: Successful models and practices, PreK-12* (pp. 231-241). New York, NY: Guilford Press.
- Rossi, P. H., Lipsey, M. W., & Henry, G. T. (2019). *Evaluation: A systematic approach*. Thousand Oaks, CA: Sage.
- Saldaña, J. (2013). *The coding manual for qualitative researchers* (2nd ed.). Los Angeles, CA: Sage.
- Schildkamp, K., & Kuiper, W. (2010). Data-informed curriculum reform: Which data, what purposes, and promoting and hindering factors. *Teacher and Teacher Education*, 26(3), 482–496. doi:10.1007/978-3-030-26879-4
- Schildkamp, K., & Poortman, C. L. (2015). Factors influencing the functioning of data teams. *Teachers College Record*, 117(4). Retrieved from <http://www.tcrecord.org>
- Schildkamp, K., Poortman, C. L., Ebbeler, J., & Pieters, J. M. (2019). How school leaders can build effective data teams: Five building blocks for a new wave of data-informed decision making. *Journal of Educational Change*, 20(3), 283–325. doi:10.1007/s10833-019-09345-3
- Schildkamp, K., Poortman, C. L., Luyten, H., & Ebbeler, J. (2017). Factors promoting and hindering data-based decision making in schools. *School Effectiveness and School Improvement*, 28(2), Art. 242. doi:10.1080/09243453.2016.1256901

- Schildkamp, K., Smit, M., & Blossing, U. (2019). Professional development in the use of data: From data to knowledge in data teams. *Scandinavian Journal of Educational Research*, 63(3), 393–411. doi:10.1080/00313831.2017.1376350
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin.
- Spellings, M. (2006). *A test of leadership: Charting the future of US higher education*. Washington, DC: U.S. Department of Education.
- Spillane, J. P. (2012). Data in practice: Conceptualizing the data-based decision-making phenomena. *American Journal of Education*, 118(2), 113–141. doi:10.1086/663283
- Spillane, J. P. (2015). Leadership and learning: Conceptualizing relations between school administrative practice and instructional practice. *Societies*, 5(2), 277–294. doi:10.3390/soc5020277
- Spillane, J. P., & Kim, C. (2012). An exploratory analysis of formal school leaders’ positioning in instructional advice and information networks in elementary schools. *American Journal of Education*, 119(1), 73–102. doi:10.1086/667755
- Stufflebeam, D. (2003). The CIPP model for evaluation. In T. Kellaghan & D. Stufflebeam (Eds.), *International handbook of education evaluation* (pp. 31–61). Boston, MA: Kluwer Academic Publishers.
- Supovitz, J., & Sirinides, P. (2018). The linking study: An experiment to strengthen teachers’ engagement with data on teaching and learning. *American Journal of Education*, 124(2), 161–189. doi:10.1086/695610

- Swan Dagen, A., & Bean, R. (2014). High-quality research-based professional development: An essential for enhancing high-quality teaching. In L. E. Martin, S. Kragler, D. J. Quatroche, & K. L. Bauserman (Eds.), *Handbook of professional development in education: Successful models and practices, PreK-12* (pp. 42–63). New York, NY: Guilford.
- Swing, R. L., Jones, D., & Ross, L. E. (2016). *National Survey of Institutional Research Offices*. Washington, DC: Association for Institutional Research.
- Swing, R. L., & Ross, L. E. (2016). A new vision for institutional research. *Change: The Magazine of Higher Learning*, 48(2), 6–13. doi:10.1080/00091383.2016.1163132
- Terenzini, P. T. (2013). “On the nature of institutional research” revisited: Plus ça change...? *Research in Higher Education*, 54(2), 137–148. doi:10.1007/s11162-012-9274-3
- Van Geel, M., Keuning, T., Visscher, A., & Fox, J. (2017). Changes in educators' data literacy during a data-based decision making intervention. *Teaching and Teacher Education*, 64, 187–198. doi:10.1016/j.tate.2017.02.015
- Wayman, J. (2005). Involving teachers in data-driven decision making: Using computer data systems to support teacher inquiry and reflection. *Journal of Education for Students Placed at Risk*, 10(3), 295–308. doi:10.1207/s15327671espr1003_5
- Wayman, J., & Jimerson, J. B. (2014). Teacher needs for data-related professional learning. *Studies in Educational Evaluation*, 42, 25–34. doi:10.1016/j.stueduc.2013.11.001
- Wayman, J., Jimerson, J. B., & Cho, V. (2012). Organizational considerations in establishing the data-informed district. *School Effectiveness and School Improvement*, 23(2), 159–178. doi:10.1080/09243453.2011.652124

Wayman, J., Wilkerson, S., Cho, V., Mandinach, E., & Supovitz, J. (2016). *Guide to using the Teacher Data Use Survey*. Washington, DC: National Center for Education Evaluation and Regional Assistance.

Zhang, G., Zeller, N., Griffith, R., Metcalf, D., Williams, J., Shea, C., & Misulis, K. (2011). Using the context, input, process, and product evaluation model (CIPP) as a comprehensive framework to guide the planning, implementation, and assessment of service-learning programs. *Journal of Higher Education Outreach and Engagement*, 15(4), 57–84. Retrieved from <http://www.jheoe.uga.edu>

Appendix A: Interview Protocol for Faculty Data Use Needs Assessment

June 2019

- I. Introductions about my Ed.D. program and project
- II. Review and sign an informed consent
- III. Question for the background of participants:
 - a. How long have you taught at the college, what discipline do you teach, and your background?
- IV. Interview Questions:
 1. Do you feel data are accessible to you? How do you access this data, and do you have challenges in the access or usability of the data?
 2. What types of data on students do you use for your teaching practice or work at the college? What types of data don't you have, but you feel would help your teaching practice?
 3. How does the data inform or has it affected how you teach?
 4. Please describe how you might collaborate on educational data with other faculty or colleagues?
 5. How would you describe the culture of data use at the college and/or district?
 6. How is data used for decision making in the college?
 7. Please describe examples of how educational data are used to make informed decisions about your work at the college.
 8. Is there anything I haven't covered that you would like to share about using data for your teaching in the college or district?
- V. Thank you to the participant.
 - a. Send a follow-up thank you via email.

Appendix B: Needs Assessment Survey Item Constructs

Table B1

Data Access

F1	Data access
Q8a	I access the district's data warehouse (inFORM) reports.
Q8b	I request data from the college or district research office.
Q8c	I have developed reports with the college or district research office.
Q8d	I have developed my own reports with data I've collected.
Q8e	I have analyzed data with a data coach at the college.
Q8f	I have analyzed data with a research analyst at the college or district.

Table B2

Data Culture

F2	Data culture
Q9a	There is a data-driven culture in the college I teach.
Q9b	The leadership of the college use data to make informed decisions.
Q9c	The leadership of the district use data to make informed decisions.

Table B3

Data Use

F3	Data use
Q10a	I use reports from our district's data warehouse (inFORM) to inform my teaching and/or daily practice.
Q10b	I use other data (not from the district's data warehouse (inFORM)) to inform my teaching and/or daily practice.
Q10c	I use data from colleagues to inform my teaching and/or daily practice.

Table B3

Data Benefits

F4	Data Benefits
Q11a	Data use helps me make informed decisions.
Q11b	Data use helps me make ethical decisions.
Q11c	Data use benefits educators and students.
Q11d	Data use is about continuous improvement in the classroom.

Table B4

Data Efficacy

F5	Data efficacy
Q12a	I can easily access and navigate the district data systems (data warehouse inFORM and MySite).
Q12b	I am comfortable collaborating around data with colleagues.
Q12c	I can formulate worthwhile questions to guide my data use.
Q12d	When I examine data reports, I am confident that my interpretations are accurate.
Q12e	Once I analyze data and draw conclusions, I know what action steps to take next.
Q12f	I am able to support others in learning how to effectively use data.

Table B5

Data Concerns

F6	Data concerns
Q13a	I worry that data will be used to shame or punish other departments in the college.
Q13b	I am concerned that data use will increase unhealthy competition among faculty in the college.
Q13c	I am concerned I do not have enough training in using the data.
Q13d	I am concerned that data use will increase unhealthy competition among faculty in the district.
Q13e	I do not trust the data that is used in reports at the college or district.

Appendix C: Open Comment Questions From the Needs Assessment Survey

1. Data Access Comment Question
Please provide any additional comments on how you access and use data in your classes or teaching.
2. Data Use Comment Question
What barriers or supports do you see in using data for your teaching and/or daily practice?
3. Data Culture Comment Question
Please provide any comments on the culture of using educational data at the college(s) and district.
4. Data Benefits Comment Question
Please provide any comments you have on the benefits or disadvantages of using data for your teaching and/or daily practice.
5. Data Efficacy Comment Question
Please provide any comments you have on how confident you feel about using data for your teaching and/or daily practice.
6. Data Concerns Comment Question
Please provide any comments you have on any concerns you have on how education data are or may be used.

Appendix D: Data Code Description for Needs Assessment Survey Comments and Interviews

Table D1

Data Code Description

Name		Files: $N = 7$ (6 interviews & 1 all survey comments)
1	Access high	1
2	Access overall	7
3	Access low	6
4	Access moderate	2
5	Collaboration with other faculty	5
6	Data benefits	7
7	Data concerns	4
8	Communication and context about data	3
9	Data culture low	4
10	Use of data: Someone else used it negatively for decisions	2
11	Data culture: Mod-high	6
12	Accountability	3
13	Data culture moderate	3
14	Data culture high	1
15	Data skill: Efficacy low	3
16	Difficult to use	2
17	Data skill: Efficacy to use	2
18	Skill-efficacy: Moderate	2
19	Skill-efficacy: High	2
20	Desire training on use of data	3
21	Do not use data	1
22	Data quality	1
23	Nonacademic barriers	5
24	Critical pedagogy	3
25	Other issues in using data	3
26	Part-time faculty issues	5
27	Types of data used	7
28	Kinds of data that is helpful for teaching	7
29	Class roster profile	5
30	Student evaluations	3
31	Use data to inform teaching	6
32	Use of data: I collected my own data	5
33	Use of data: I work with the IR office	4

Appendix E: Intervention Data Collection and Analysis Matrix

Table E1

Faculty Data Use: Collaborative Professional Learning Series: Research Question

Research question	Construct	Data source(s)	Data collection tool	Frequency	Data analysis
RQ1: To what extent did the intervention change faculty's access and support to use data?	Data access and support	Faculty Data coaches	Pretest posttest survey (faculty only)	FDU Survey taken before the start of the FDUC intervention and after the last session (2x)	Dependent <i>t</i> -test A priori and emergent coding, thematic analysis
RQ2: What is the impact on faculty data use attitude and self-efficacy in using after participating in this intervention?	Data attitude and self-efficacy	Faculty	Postsession focus group interviews Pretest posttest survey (faculty only)	Focus group interviews FDU Survey taken before the start of the FDUC intervention and after the last session (2x)	Dependent <i>t</i> -test A priori and emergent coding, thematic analysis
RQ3: To what extent did the intervention change faculty's data use collaboration after participation in the intervention?	Data collaboration	Faculty	Posttest survey comments Postsession focus group interviews	Once after the conclusion of the professional development workshops. Focus group interview	A priori and emergent coding, thematic analysis

Table E2

Faculty Data Use: Collaborative Professional Learning Series: Process Evaluation

Process evaluation question	Process evaluation indicator(s)	Data source(s)	Data collection tool	Frequency	Data analysis
Process question: What was the level of engagement of faculty in the intervention activities?	Faculty engagement	Faculty data coaches researcher	Attendance records Postsession reflection Researcher's notes	Attendance & researcher notes throughout the study and after each activity Postsession evaluation & reflections after each session (4x)	Descriptive statistics A priori and emergent coding Thematic analysis

Potential moderating variables included the following:

- Years of teaching
- Full- or part-time faculty status
- Faculty demographics
- Discipline
- Prior training in using data literacy principles

Appendix F: Faculty Data Use Intervention Pretest-Posttest Survey Instrument

Adapted from Wayman, J., Wilkerson, S., Cho, V., Mandinach, E., & Supovitz, J. (2016) Guide to Using the Teacher Data Use Survey.

Dear Faculty,

The SOCCCD inFORM Data Warehouse is planning an upgrade of its reporting and data systems over the next two years. As part of the initial assessment and planning, stakeholders in the district will be sought to provide feedback on their data needs.

As part of the improvements to the district's data warehouse, I am also researching our faculty's educational data use for an education doctorate program. The study will include a professional learning opportunity conducted by the district's research office with faculty to better understand what helps or hinders faculty in using educational data in the district's systems. A pre and post-test survey instrument is part of the data collection methodology and all faculty's perspective is important to this research in understanding how to make our services and systems better.

The survey is optional and anonymous, and all responses will be kept confidential. By completing this survey or questionnaire, you are consenting to be in this research study. Your participation is voluntary, and you can stop at any time. All responses will be aggregated for analysis. The survey should take approximately 5-10 minutes.

Please contact me at the information below if you have any questions or concerns.

Thank you so much for your time and responses!

Denice

Denice Inciong
District Director of Research, Planning, and Data Management
South Orange County Community College District
dinciong@socccd.edu



* 1. Please provide your name:

* 2. Please provide the best email address to contact you:

* 3. Employment Status

☐ Full-Time

☐ Part-Time

* 4. Have you ever been a Department Chair?

☐ Yes

☐ No

* 5. Please provide your department or discipline:

* 6. Years teaching at the college level:

* 7. Years teaching in the South Orange County Community College District.

8. Gender

☐ Female

☐ Male

☐ Nonbinary

☐ Decline to state

* 9. An additional research study is seeking faculty participants for a professional learning workshop series starting in September, during the Fall 2020 semester. A group of faculty will be selected to examine data on their courses and students from various data systems in the district and work with the research office to answer educational research questions. Would you be interested in participating in this study?

- ☐ Yes
- ☐ No
- ☐ Maybe

* 10. The district has systems and other technology to help you access and use student and enrollment data. The following questions ask about the district's inFORM data systems. Please indicate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I have the proper access to technology to efficiently examine data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The inFORM data warehouse reports provides me access to lots of data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The inFORM data warehouse reports are easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The inFORM data warehouse reports allow me to examine various types of data at once (e.g., enrollment, success, demographics, etc.).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The inFORM data warehouse reports generates displays (e.g., reports graphs, tables) that are useful to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 11. These questions ask about supports for using data. Please indicate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I am adequately supported in the effective use of data on my students and classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am adequately prepared to use data about my students and classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is someone who answers my questions about using data on my students and classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is someone who helps me change my practice (e.g., my teaching) based on data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My district provides enough professional development in data use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My district's professional development is useful for learning about data use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 12. These questions ask about your attitudes and opinions regarding data. Please indicate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Using data on my students and classes helps me plan my instruction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using data offers me information about students that were not already known.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using data helps me know how students are doing in my class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using data helps me identify how to help students learn better.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using data helps my students do better in my classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 13. These questions ask about your attitudes toward your own use of data. Please indicate how much you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I am good at using data to diagnose student learning needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at formulating questions about my classes and know where to find the data to answer my questions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at collecting data to answer questions about students in my classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at using data to plan my lessons.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at using statistics to analyze data about questions about my students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at interpreting data from reports, charts, or graphs and drawing conclusions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am good at adjusting instruction based on data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 14. Do you use data with or in a team or group, such as with your department or for specific projects in the college?

☐ Yes


☐ No

****If yes, go to Q15 if No, End of Survey***

15. Think about the team or group you use data with the most at the college. Please choose the frequency the aligns the closest to your use of data with this group.

	Never	One or two times a year	A few times a year	Monthly	Weekly
We approach an issue by looking at data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We discuss our preconceived beliefs about an issue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We identify questions that we will seek to answer using data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We explore data by looking for patterns and trends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We draw conclusions based on data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We identify additional data to offer a clearer picture of the issue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use data to make links between instruction and student outcomes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When we consider changes in practice, we predict possible student outcomes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We revisit predictions made in previous meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We identify actionable solutions based on our conclusions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please provide any other comments you have about your use of data with others in the college.



Thank you very much for completing this survey.

If you have any questions or would like to provide more feedback about the district's data systems, please contact Denice Inciong at dinciong@socccd.edu.

Appendix G: Intervention Session Feedback Survey (Faculty and Data Coaches)

Faculty Data Use Strategies Session Feedback

1. Did the session meet the stated objectives?

☐ Yes

☐ No

* 2. How relevant were the topics covered in the session to you?

☐ Extremely relevant

☐ Very interested

☐ Somewhat relevant

☐ Not so relevant

☐ Not at all relevant

3. What did you find in today's workshop that may be useful for your teaching practice?

4. How could today's session be improved?

Appendix H: Intervention Postsession Focus Group Protocol

Focus Group Interviews (Faculty Participants)

1. Data Workshop Content:
 - a. Please tell us about the questions you still have about your students and the teaching you hope to answer using data.
 - b. Are you able to identify and analyze data to answer these questions?
 - c. What questions remain for you in using data?
 - d. What else would you like to learn about using data?
2. Data Workshop Experience:
 - a. Please tell us how you feel about participating in these data workshop sessions.
 - b. Please tell us how you feel about having support from the research office.
 - c. Please tell us how you feel about discussing and collaborating on data with other faculty.
3. Using Data in Practice:
 - a. How do you plan to use what you learned in this workshop for your teaching?
 - b. What would help you sustain or get better at using data for your teaching?
4. Is there anything we have not covered about the experience that you would like to share?

Focus Group Interviews (Data Coaches)

1. Data Use Workshop Content:

- a. How did you feel about the topics covered in the workshops?
 - i. Were there topics you felt we should have done more of or less of?

2. Data Use Workshop Experience:

- a. How did you feel about your experience as a data coach?
 - i. Was it what you expected?
 - ii. Were there things you would have liked to have done or tried?
- b. What do you think helped the faculty in the workshop experience?
- c. What do you think was not helpful for faculty?
- d. Please tell me about the experience of faculty working with other faculty.
 - i. What role did you play in this process?

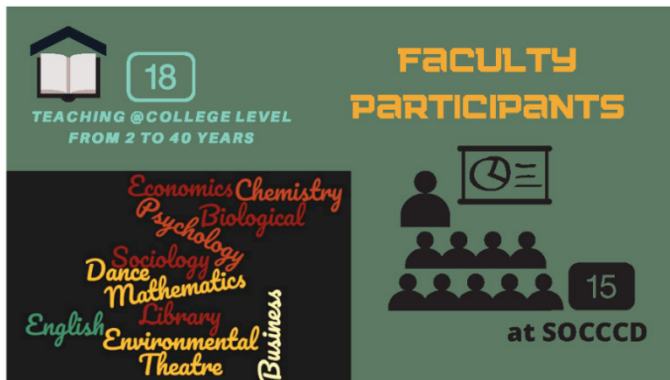
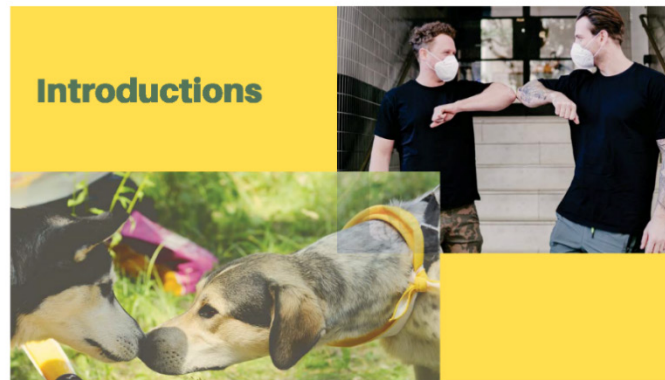
3. Using Data in Practice:

- a. What did you think are the most important areas faculty expressed in using or planning to use what they learned in this workshop for their teaching?
- b. How did faculty express what would help them sustain or get better at using data for their teaching?

4. Is there anything else in our faculty data use workshop that I haven't asked that you would like to share about this experience?

Appendix I: Intervention Workshops Agendas and Presentation

Workshop 1 Agenda: Introduction and Data Identification





SURVEYED FACULTY (NEEDS ASSESSMENT) FINDINGS

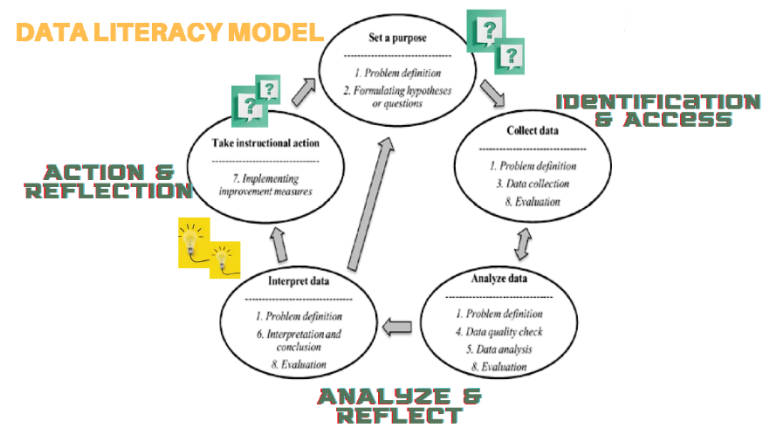
Positive culture of data use but some negative experiences of faculty in the use of data.

Faculty see value in using data but many do not use data that is available.

Many faculty expressed wanting to learn more about how to access and use data.

Some faculty would like to see more opportunities for faculty collaboration.

PROJECT TO ADDRESS FINDINGS:
FACULTY DATA WORKSHOP



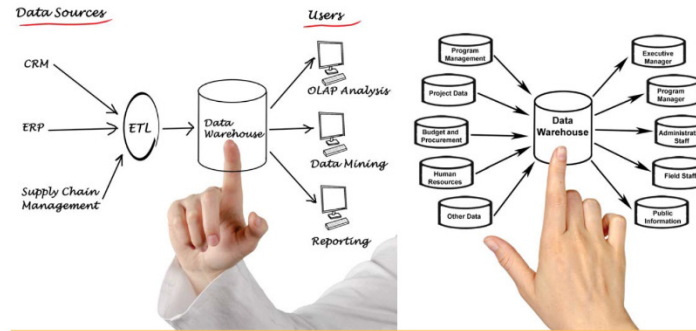
Group Activity

What motivated you to participate in the workshop?

What educational data questions do you hope the workshop can help answer?



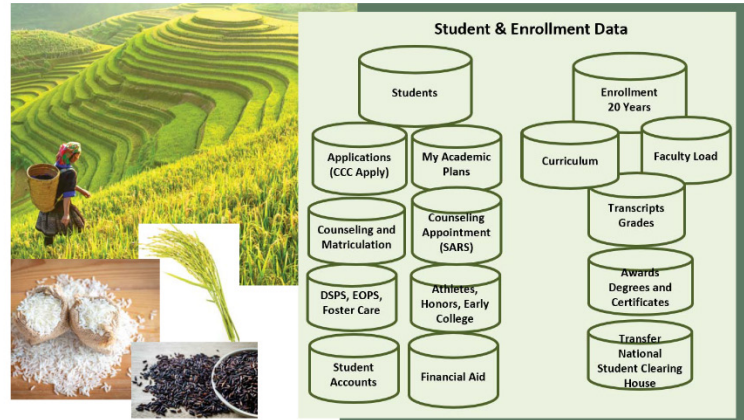
What is a Data Warehouse?



SOCCCD DATA WAREHOUSE OVERVIEW

Established in 2007

OFFICE OF RESEARCH, PLANNING & DATA MANAGEMENT





WAYS TO CONSUME AND ANALYZE DATA

OVERVIEW OF INFORM REPORT USER GUIDE

USER GUIDE

INFORM REPORT USER GUIDE
South Orange County Community College District

INFORM MAIN PAGE

STANDARD REPORTS

**SELF-SERVICE
REPORTS**

**REQUESTED DATA
REPORTS**

**SPECIAL PROJECT
REPORTS**

DIFFERENT WAYS TO CONSUME DATA

SELF-SERVICE REPORTS FOR ACCOUNTABILITY ENROLLMENT MANAGEMENT FACTBOOK

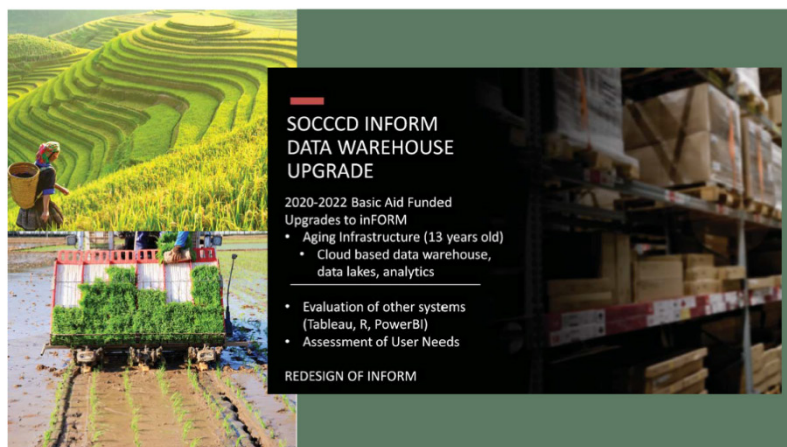
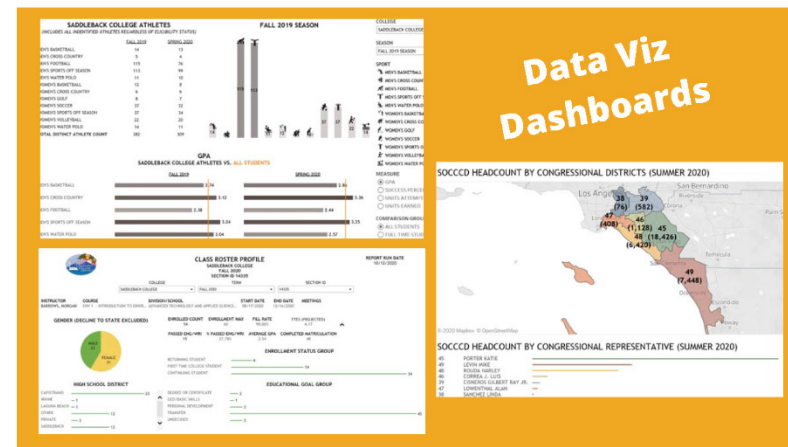
Institutional Effectiveness Reports (Section 1-8)

- Section 1 - College Student Profile
- Section 2 - Instructional Offerings
- Section 3 - Student Progress
- Section 4 - First-Time College Students
- Section 5 - Developmental Education: Basic Skills
- Section 6 - Career and Technical Education
- Section 7 - Student Achievement
- Section 8 - Transfers

NOTE: Please note that Section 9 - Employees is currently out-of-date and needs to be re-developed

Instructional Reports

- College Daily Term Comparison Report
- Current vs. Previous Term Point-in-Time Comparison Report
- Interactive Enrollment Report
- Enrollment Comparison Report
- Section Detail
- Section Detail with Instructor, Meetings and Enrollment



DATA PROJECTS

Understand data use & develop reports or visualizations
FAULTY DESIGN TEAMS

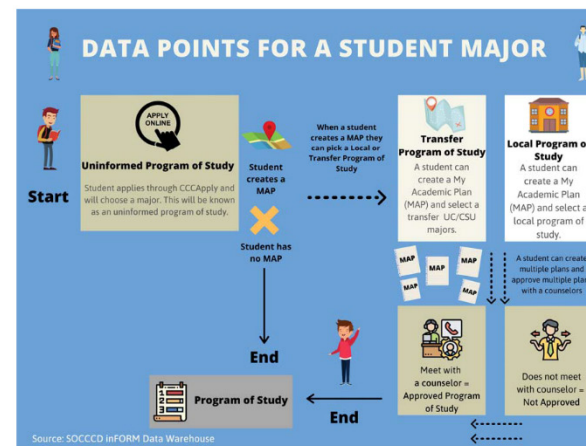
Questions:

Where do students indicate their major?

What data should we use to determine majors?

What do faculty want to know about student majors?

STUDENT MAJORS



1. What percentage of students at Saddleback in Fall 20 select "undecided" as a major when they filled out their application?
Answer: 33% (of these 46% have an ed goal of personal development)
2. What percentage of students at IVC in Fall 20 select "undecided" as a major when they filled out their application?
Answer: 19% (of these 61% have an ed goal of transfer)
3. Generally what percentage of students in Fall 20 chose an educational goal of transfer in their application?
Answer: between 50% to 60%
4. Generally what percentage of the students in Fall 20 have created a MAP plan?
Answer: between 60% to 70%
5. What is the average number of MAP plans created by students in Fall 20?
Answer: 3
6. What is the highest number of MAP plans created by a student enrolled in Fall 20?
Answer: over 200 (Approximately 90,000 MAP plans for Fall 20 students)

FACULTY DASHBOARD

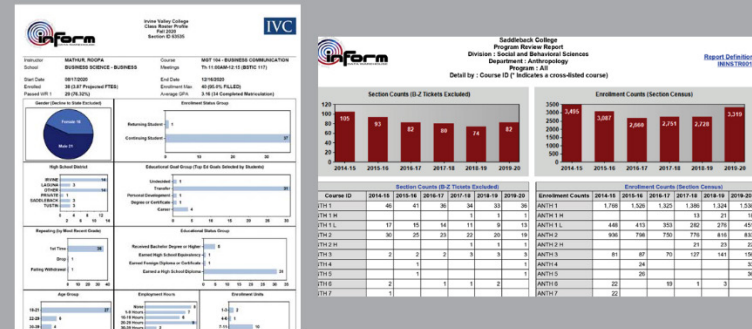


Questions:

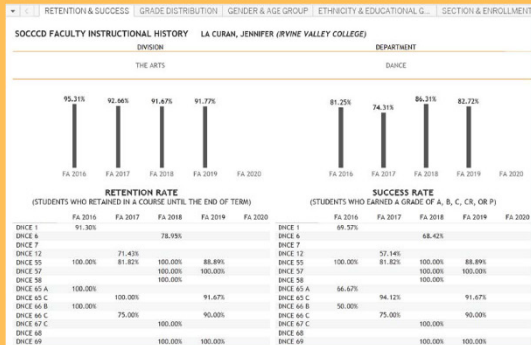
What data should we use to determine majors?

What do faculty want to know about student majors?

Class Roster Profile & Program Review



PROTOTYPE OF FACULTY DASHBOARD



INDIVIDUAL DATA PROJECTS



Questions:

Is the information in the prototype useful for faculty?

Is it easy to understand?

Is there other information faculty might need from the data warehouse?

Choosing Teams

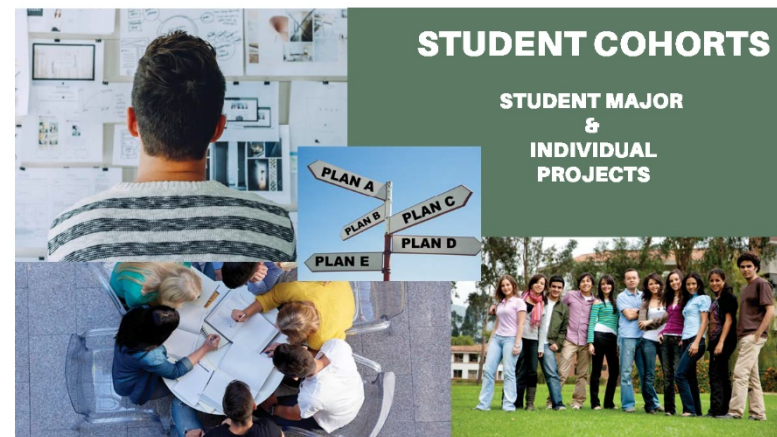
Next Steps....

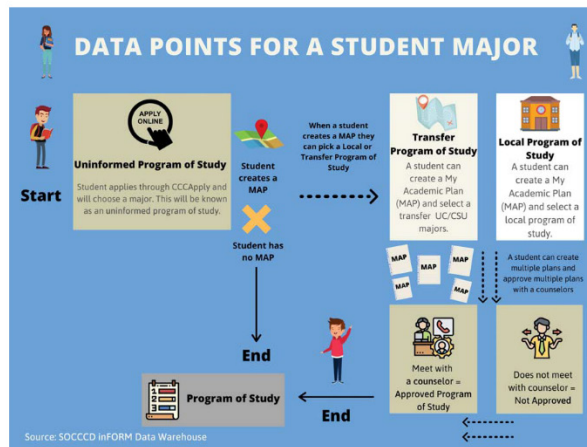
Workshop 2 Agenda: Identification and Analysis



Agenda

- I. Brief Recap from Workshop 1
- II. Majors Data
- III. Data Projects
- IV. Feedback





Data Projects Plan

Today: Further Define Questions & Explore Existing Reports

- 1) Specific Student Cohorts - Individual Projects
First Generation Students, Transfer Ready (Through the Gate)
- 2) Faculty Dashboard Prototype - Deeper Dive

November 2: Open Session (3:00 - 5:00)

November 9:

- Explore Data & Analysis & Possible Actions

November 16:

- Share out & Discuss Future Development and Interests

November 23: Optional Session (3:00 - 5:00)

Ranked Major Explanation



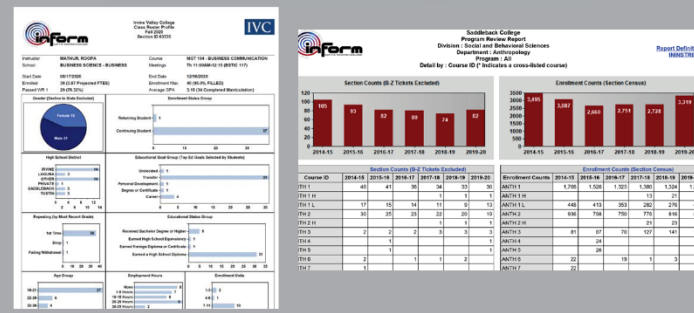
FACULTY DASHBOARD



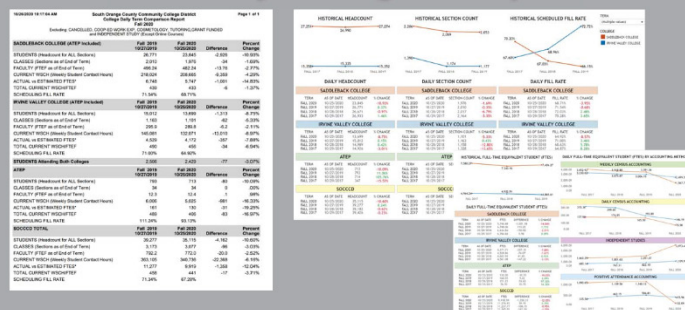
Student Cohorts

1. First-Generation Students, Low SES
2. Transfer Ready-ish but not getting through the "transfer gate"
3. Other inFORM questions related to topics

Review of inFORM Class Roster Profile & Program Review



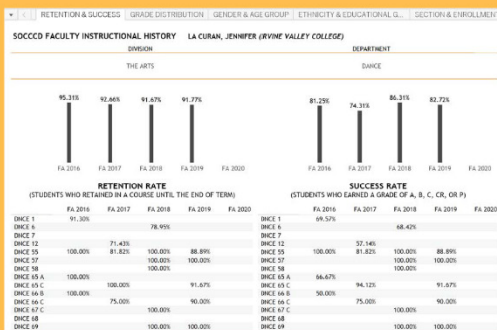
Review of inFORM Brief History of Management Reports



Group Activity

- Student Cohorts - Individual Projects - First Generation, Transfer Ready**
 - Define questions, review existing reports (examples like Honors or Athletes), discuss data sets, scope time for initial data
- Faculty Dashboards**
 - Review Program Review Reports for Context
 - We'll navigate through Morgan's dashboard and have other faculty navigate there dashboards
 - Go through each tab:
 - Tell us about the layout (choice of graphs and charts)
 - Data definitions and understanding
 - Interpretation and analysis
 - Does it confirm what you know or raise any questions?
 - Are there other data that you would need?
 - Other tools that would make it easier to understand?

[Comments](#)
[Feedback](#)



COURSE FILL RATES: BARROWS, MORGAN (FALL 2020)

COURSE ID:

TERM:

INSTRUCTOR:

☒ EMBEDDED COUNT
☒ ROLLED EMBEDDED RATE

COURSE ID	REGISTRATION START	TERM START	TERM END/US	Fill Rate (%)
DSW 1	05/17/20	08/16/20	06/29/20	~95
DSW 16	05/17/20	08/16/20	06/29/20	~25
DSW 18	05/17/20	08/16/20	06/29/20	~42
DSW 40	05/17/20	08/16/20	06/29/20	~37

Workshop 3 Agenda: Reflection and Application



Agenda

- I. Brief Recap from Workshop 2 and Open Session
- II. Update on Data Projects:
 - Specific Projects on Student Cohorts
 - Faculty Dashboard - Group Activity
 - Student Majors - Group Activity
 - Ranked Program of Study Dashboard
- III. Plan after Workshops
- IV. Feedback



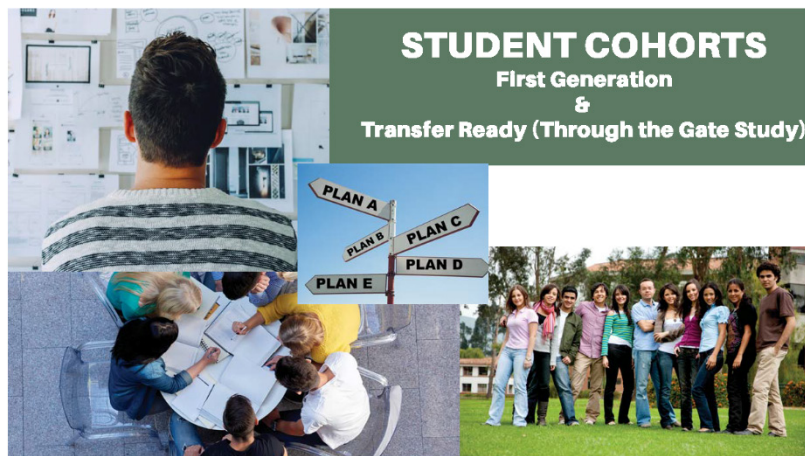
Data Use Projects Plan

Today: Refining Data Projects and Future Plans

November 16:

- Share out on where we are so far
- Discuss Future Development of Dashboards and Data Projects-Spring 2021

November 23: Optional Session (3:30 - 5:00)



STUDENT COHORTS

First Generation
&
Transfer Ready (Through the Gate Study)



FACULTY DASHBOARD

Student Cohorts

Projects:

- **Psi Beta** - Tracking Student Groups
 - Tag students with a characteristics (Psi Beta) - form to capture these students
 - **First-Generation College** outcome data
 - Focus groups
- **Transfer Ready**
 - Data set on current students who meet the criteria
 - Through the Gate - RP Group Transfer Study
 - The five stages of the transfer continuum
 - Only focus on Transfer Explorers but a refined sub group
 - Counselors to review information for outreach

PROTOTYPE OF FACULTY DASHBOARD

Feedback
HighLights

Overall:

- Dashboards seem understandable & overall useful

Improvements/Adjustments:

- **Comparisons** at the **program** and **college** level
- **Disaggregation to the section level of courses**– drill down
- Filter for **online courses versus face-to-face**
- **Cross-listed/Concurrent** courses - ability to group
- **Course level fill rate over time** – helpful for discussions on what to keep or eliminate in the schedule
- **Student Majors** by course – useful and interesting

**Feedback
HighLights**

PROTOTYPE OF FACULTY DASHBOARD

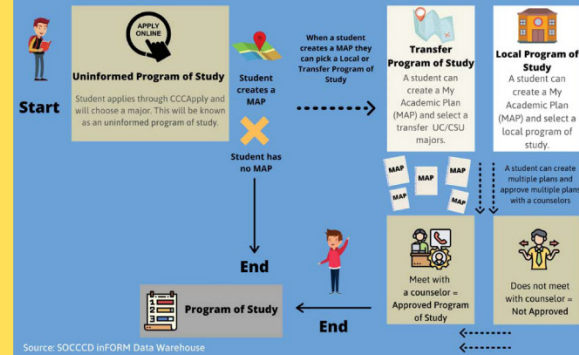
Not Useful or Needed

- WSCH, FTES, Productivity Metrics

Additional Comments:

- More time to discuss on how to use data
- PD for others to learn about this data
- Other data sources:
 - Drop Survey
 - Canvas Data
 - Course Evaluations or Mid-Semester Course Evaluations

DATA POINTS FOR A STUDENT MAJOR



Group Activity Questions:

How can we share and validate the design of the faculty dashboards with more faculty?

How would you introduce other faculty in your department/college to this dashboard?

RANKED PROGRAM OF STUDY

What will be considered the student's ultimate program of study

HIERARCHY OF DATA SOURCE OF A STUDENT'S MAJOR

1. APPROVED MAP PROGRAM OF STUDY

A student's latest created approved MAP plan would be identified as their ranked program of study

- 1.1 Local Program of Study or
- 1.2 Transfer Program of Study

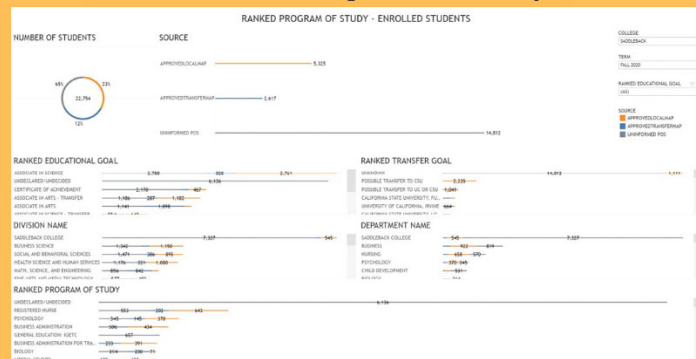
2. UNINFORMED PROGRAM OF STUDY

If a student does not have a MAP then the student's uninformed program of study would be identified as their ranked program of study

2. NOT APPROVED MAP PROGRAM OF STUDY NOT USED IN RANKING

If a student does not have an approved MAP then the latest created unapproved MAP would be identified as their ranked program of study

Overview of Creating a Ranked Major



Group Activity

Facilitator to review the Course Majors Dashboard

Discuss what is useful, not useful in the dashboard, and what questions do you have?

How would you use this information for your teaching?

Student Majors by Faculty Courses



Next Steps

[Feedback Survey - https://www.research.net/r/FDUWS3](https://www.research.net/r/FDUWS3)

November 16:

- Share out on projects
- Discuss plan for development of dashboards and data projects
- Interest in participation on these projects in Spring 2021

November 23: Optional Session (3:30- 5:00)

Thank you!

Workshop 4 Agenda: Application and Future of Data Use for Faculty



Agenda

I. Summary, Thank you, Next Steps

Data Projects

- Projects on Student Cohorts
- Faculty Dashboard

II. Focus Groups

III. Finale - Data Games



Next Steps:

Further Develop Faculty Data Projects:

- Psi Beta, Transfer Ready
- Revise faculty dashboard with course fill rate and student majors

Final Post-Survey for participants will be sent after this session

- Question on collaborating with us in Spring 2021

Focus Groups

Group 1 -Main Zoom (Denice & Gene)

Jennifer, Brent, Edwin, Roya, April, Steven, Roopa, Cheryl, Bill

Group 2 - Separate Zoom link (Judy, Nicole, Tasha)

Alannah, Michael, Claire, Kathy, Kris, Tuan, Carrie, Morgan, Summer

Focus Group Question Set 2 - Data Workshop Experience (10 minutes)

Please tell us how you feel about participating in these data workshop sessions.

Please tell us how you feel about having support from the research office.

Please tell us how you feel about discussing and collaborating on data with other faculty.

Focus Group Question Set 1 - Data Workshop Content (10 minutes)

Please tell us about the questions you still have about your students and teaching you hope to answer using data.

Are you able to identify and analyze data to answer these questions?

What questions remain for you in using data?

What else would you like to learn about how to use data?

Focus Group Question Set 3 - Using Data in Practice (10 minutes)

How do you plan to use what you learned in this workshop for your teaching?

What would help you sustain or get better at using data for your teaching?

Is there anything we have not covered about the experience that you would like to share?

PLEASE REJOIN MAIN ZOOM SESSION

Data Quiz

1. What % of Saddleback and what % of IVC students enrolled in the Fall 2020 have an approved MAP plan?
a. Saddleback = 35% and IVC = 48%
2. What does WSCH mean? Weekly Student Contact Hours
3. Which metric(s) are we adding to the faculty dashboard next?
a. Course fill rate trends and student majors
4. What was the colleges' success rate (in courses) in Fall 19?
a. Saddleback = 72% and IVC = 73%
5. What two places are student's major data captured?
a. Application, Registration, MAPs
6. What does UPOS mean? - Uninformed Program of Study
7. What is the name of the district's Tableau server? (bonus) - inVISION

Data Games

Data Quiz

1. What % of Saddleback and what % of IVC students enrolled in the Fall 2020 have an approved MAP plan?
2. What does WSCH mean?
3. Which metric(s) are we adding to the faculty dashboard next?
4. What was the colleges' success rate (in courses) in Fall 19?
5. What two places are student's major data captured?
6. What does UPOS mean?
7. What is the name of the district's Tableau server? (bonus)

DATA SCAVENGER HUNT

2 Teams will compete in the scavenger hunt:

Each Team will have 5-7 minutes to find 4 things that start with the letter "D" "A" "T" "A" and a tie-breaker item.

Each team will decide who in their team has the best item for each letter and tie-breaker. Once your team decides on the 5 items, come back to the main zoom room and we will have the data team challenge to decide which team has the winning scavenger hunt items.

DATA SCAVENGER HUNT

- a. Find the cutest thing that starts with the letter "D"
- b. Find the tastiest thing that starts with the letter "A"
- c. Find the funniest thing that starts with the letter "T"
- d. Find the anything that starts with the letter "A"

- e. Tie Breaker – find the something in your house that either says data or shows data.

Bring winning items back to main room for the data teams run-off!

Session Feedback Survey:
<https://www.research.net/r/FDUWS4>

Post-Workshop Survey:
<https://www.research.net/r/FDUPOST>

*Thank
you!*

Curriculum Vitae

DENICE LEE INCIONG CURRICULUM VITAE

23682 Calle Ganador, Mission Viejo, CA 92691
dinciong@socccd.edu | denicesugi@yahoo.com
Office: 949-582-4997 Cell: 949-872-9959

EDUCATION

Education Doctorate in Entrepreneurial Leadership in Education August 2021
Johns Hopkins University, Baltimore, MD
Dissertation Title: *Community College Faculty Use of Educational Data*

Master's Degree in Educational Foundations December 1999
University of Hawaii, Manoa, Honolulu, HI
Master's Thesis on Peace Education in Hawaii

Bachelor's Degree with Honors in Asian Studies and Japanese May 1992
University of Hawaii, Manoa, Honolulu, HI

HONOR/AWARDS

Johns Hopkins University Education Doctorate Merit Scholarship 2019-2021
SOCCCD District Services Manager Certificate of Excellence 2017
SOCCCD District Services Manager of the Year 2013
Panelist on Higher Education Data Warehousing 2010
Association for Institutional Research (AIR) Forum, Chicago

CONFERENCE PRESENTATIONS

"Planning Primer: Current Issues in the IRP Field," The Research and Planning Group of California, Summer Institute, June 2016.
"Agile Methodology in Developing Business Intelligence," Higher Education Data Warehouse (HEDW) Conference, 2012
"Saddleback College's Athlete Scoreboard," HEDW Annual Conference, Seattle 2011
"Using SharePoint for Metadata management," HEDW Annual Conference, Seattle 2011
"Saddleback College's Athlete Scoreboard," California Community College Athletic Director Annual Conference, Tahoe, 2011

POSTER PRESENTATION

Inciong, Denice. Faculty Data Use. Poster presented at Johns Hopkins University, School of Education, Education Doctorate Residency, 2019.

PROFESSIONAL ACTIVITIES:

Accrediting Commission for Community and Junior Colleges (ACCJC) (2016 -2019)
Accreditation Evaluation Team Member on 3 Accreditation Evaluation Teams
ACCJC Standards Reading Review Team Member, 2021-2022

Research and Planning Group of California Board of Directors (2013-2020)
At-Large Representative for Southern Region, Chair of Professional Development, Chair of Planning and Policy; RP Group Conference Committee Co-Chair

Institutional Effectiveness Partnership Initiative Professional Resource Team (IEPI PRT) (2015-2021)

Associate Editor, *Journal of Applied Research for Community Colleges* (2008-2011)

PUBLICATIONS

Contributing Author, *A Qualitative Study of Two-to-Four-Year Transfer Practices in California Community Colleges: An Analysis of Seven Case Studies Featuring Colleges with Consistently Higher-Than-Expected Transfer Rates Fall 2008 -*
https://rpgroup.org/Portals/o/Reports/TLC_Cross_Case_Analysis.pdf

TECHNICAL SKILLS

- Development and Management of Data Warehouse- Kimball methodology
- Data Visualization Principles
 - Workshops with Edward Tufte and Stephen Few
 - Data visualization using Tableau software
- Completed Green Belt Certification in Six Sigma (2010)
- Completed Project Management course (2011)
- Tableau Desktop and Tableau Server
- Microsoft Office - Word, Excel, PowerPoint, Access, Outlook
- SPSS - Statistical Software
- NVivo Qualitative Software
- Survey Software - Scantron Class Climate, Qualtrics, Survey.net, SurveyMonkey
- Cardiff Teleform (Survey Creation and Scanning)
- Brio Query (Data Querying and Reports) and eListen (Survey Creation and Data Collection)
- ParSystem (Scantron Testing Software)

EMPLOYMENT

Dean, Research and Data Analytics 8/2021-8/2022
California Community College Chancellor's Office - Interjurisdiction Exchange

District Director of Research, Planning and Data Management 4/2008 - present
South Orange County Community College District, Mission Viejo, California

Research and Planning Analyst 7/2004 -4/2008
Saddleback College, Mission Viejo, California

Consultant on Transfer Leadership Center Project (TLCP) 2006-2008
California Community College Chancellor's Office Grant

Administrative Analyst/Evaluator 2/2001 – 7/2004
University of California, Irvine - Center for Educational Partnerships